An Assessment of the Commercial Fishery and Population Structure of Walleye in Tathlina Lake, Northwest Territories

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by

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ABSTRACT

Roberge, M.M., G. Low, and C.J. Read. 1988. An assessment of the commercial fishery and population structure of walleye in Tathlina Lake, Northwest Territories. Can. Tech. Rep. Fish. Aquat. Sci. 1594: v + 54 p.

Biological samples have been taken for most years since 1975 from the commercial walleye fishery from Tathlina Lake, Northwest Territories. Together with information collected from an experimental gill netting program in 1979, the status of the walleye stock is assessed and a management strategy is formulated.

Variations in both the fishing effort and walleye abundance since 1954 is likely the cause of fluctuations in the commercial production of walleye. Factors resulting in annual changes in mean length and in particular in mean age since 1975 include timing and location of fishing effort, variability in year class strength and recruitment failure. Fluctuations in instantaneous total mortality are considered to be due to changes in fishing mortality. The impact on these changes by the domestic fishery is unknown but believed to be minimal. The minimum mesh size of 108 mm, in use since 1981, appears to be protecting the pre-recruitment segment of the population.

Despite continued commercial exploitation, walleye still remains a dominant fish species in Tathlina Lake. Measuring the changes in the size, age, growth, and mortality of walleye between 1946 and 1979 is difficult, since in 1946 the walleye population was recovering from a winterkill in 1942-43.

In the past harvesting of walleye in excess of 20 000 kg appears to have resulted in a significant increase in the rate of exploitation and a decrease in survival. Considering the history of the fishery including this increase in exploitation and the ever present possibility of winterkill, the annual commercial quota should not exceed 20 000 kg.

Key words: Catch curve; catch statistics; experimental gill netting; fishing mortality; Stizostedion vitreum; stock assessment; tagging.

RÉSUMÉ

Roberge, M.M., G. Low, and C.J. Read. 1988. An assessment of the commercial fishery and population structure of walleye in Tathlina Lake, Northwest Territories. Can. Tech. Rep. Fish. Aquat. Sci. 1594: v + 54 p.

Des prélèvements ont été effectués presque chaque année depuis 1975 sur les prises commerciales de doré du lac Tathlina, dans les Territoires du Nord-Ouest. Ces prélèvements, ainsi que les données recueillies dans le cadre d'un programme expérimental de pêche au filet maillant en 1979, servent à faire l'évaluation du stock de doré et à formuler une stratégie de gestion.

Les fluctuations des prises commerciales de doré expliquent vraisemblablement les fluctuations de l'effort de pêche et de l'abondance du doré depuis 1954. Les variations annuelles de la longueur moyenne et, en particulier, de l'âge moyen depuis 1975 sont attribuables, entre autres facteurs, à l'endroit et au moment où s'exerce l'effort de pêche, à la variabilité du nombre de sujets dans les classes d'âge et à l'insuffisance du recrutement. On considère que les fluctuations de la mortalité totale instantanée sont liées aux variations de la mortalité due à la pêche. Les effets sur ces changements qui sont attribuables à la pêche de subsistance ne sont pas connus, mais on estime qu'ils sont minimes. La grandeur minimale de maille de 108 mm, en vigueur depuis 1981, semble protéger les pré-recrues dans la population.

Le doré, même s'il est exploité commercialement de façon continuelle, demeure une des espèces dominantes dans le lac Tathlina. Il n'est pas facile de mesurer les variations de la taille, de l'âge, de la croissance et de la mortalité du doré entre 1946 et 1979, car la population de 1946 se ressentait encore des effets d'une mortalité hivernale survenue en 1942-1943.

Il semble que des captures de plus de 20 000 kg de doré aient donné lieu, dans les années précédentes, à une augmentation sensible du taux d'exploitation et à une diminution de la survie. Compte tenu des antécédents de la pêche, notamment de cette intensification de l'exploitation et de la possibilité, toujours présente, de mortalité au cours de l'hiver, le contingent annuel de pêche commerciale ne devrait pas dépasser 20 000 kg.

Mots-clés: Courbe des prises; statistiques sur les prises; pêche expérimentale au filet maillant; mortalité due à la pêche; Stizostedion vitreum; évaluation du stock; étiquetage.

INTRODUCTION

The walleye, Stizostedion vitreum vitreum (Mitchill), occurs in Canada from central Quebec to northeastern British Columbia and from the Canada/U.S. border to the Northwest Territories. It is considered to be the most economically valuable fish species in Canadian inland waters (Scott and Crossman 1973). In the Northwest Territories (NWT), walleye (commonly referred to as pickerel) are confined to the Mackenzie River drainage reaching their northern limit in the Mackenzie Delta (Scott and Crossman 1973). Although the distribution of walleye in the NWT is limited, it is considered to be both an important commercial and recreational fish species.

Information on the biology and harvest of walleye in the NWT is meager in comparison to that for walleye from other areas of Canada. Miller (1947), Rawson (1947, 1951), and Johnson (1976) provide general information on walleye from Great Bear and Great Slave lakes. Falk and Dahlke (1975), Falk et al. (1980), and Bond et al. (1978) describe the walleye sport fisheries occurring along the south shore of Great Slave Lake while Hatfield et al. (1972a,b), Stein et al. (1973a,b), Jessop et al.(1973, 1974), Jessop and Lilley (1975), and Lilley (1975) provide comprehensive biological data on walleye occurring in the Mackenzie River and its many tributary streams. Roberge et al. (1986) assess the walleye population from Kakisa Lake and make management recommendations for this NWT commercial walleye fishery.

Annual commercial production of walleye in the Northwest Territories has averaged over 40 000 kg (round weight) since the late 1970's. Over 95% of this production is taken from three lakes: Great Slave, Kakisa, and Tathlina. The walleye harvest from Tathlina Lake accounts for over 30% of the total production. However, despite the importance of this fishery, biological data collected on the Tathlina Lake walleye population has been minimal.

Tathlina Lake was first surveyed in 1946 by the Fisheries Research Board of Canada and the federal Department of Fisheries to determine whether the lake could support a commercial fishery for either lake whitefish (Coregonus clupeaformis) or walleye (Kennedy 1962). As a result of the study, whitefish were not recommended for commercial harvest due to their small size and the belief that these whitefish were of a "dwarf race". It was felt though that a commercial fishery for walleye was feasible; however, due to a major winter kill of walleye in 1942/43, the fishery could not be initiated until at least 1950. Subsequently, Tathlina Lake was first commercially fished in the 1953/54 fishing season (01 November 1953 to 31 October 1954) with monitoring of the annual harvest occurring since that time. However, biological sampling of the commercial catch, as part of the monitoring program, has only taken place since 1975.

In 1974, the Department of Fisheries set a series of gill nets to provide a preliminary assessment of the exploited walleye population (W. Bond, DFO, Winnipeg, Manitoba, personal communication). Then in 1979, the Department of Fisheries and Oceans (DFO) conducted an experimental gill netting program to determine the status of the exploited walleye stock and to collect information on the population structure of walleye inhabiting Tathlina Lake. Information collected from this study combined with the data collected from the monitoring program is examined in this report. The status of the Tathlina Lake walleye stock is discussed and a management strategy, with total allowable catch (TAC), is recommended.

STUDY AREA

Tathlina Lake forms a part of the Kakisa River drainage basin (Fig. 1). The river system, 496 km long, originates west of the Cameron Hills and drains an area of 14 900 km^2 (Environment Canada 1980). The upper reaches of the river meander through low muskeg country occasionally flowing over small rapids and riffles. The water is stained a transparent brown, characteristic of most muskeg drainages. The river slows and deepens to 3 m before entering the west end of Tathlina Lake. The river flows out of the northeast corner of Tathlina Lake and drops 55 m before entering the south end of Kakisa Lake. One series of rapids, located 4 km upstream of Kakisa Lake, is particularly violent and may discourage the majority of fish movement between the two lakes. The river, which continues from the northeast corner of Kakisa lake, is shallow and wide with a moderate current and is often choked with aquatic vegetation by midsummer. The river again drops 15 m over the Lady Evelyn Falls located 5 km downstream of Kakisa Lake. The falls form an effective barrier to the upstream migration of fish from Great Slave Lake. The river continues as a series of rapids flowing over a limestone bottom and drains into Beaver Lake at the upstream end of the Mackenzie River.

Tathlina Lake (Fig. 2), situated in the wet low-lying area composed mainly of black spruce muskeg, is approximately 50 km long, is 30 km wide, and has a surface area of approximately 57 300 ha (Kennedy 1962; Inventory Canadian Freshwater Lakes 1969). The lake is generally shallow ($\bar{Z}$=1.5 m) and has a uniform hard silt bottom except for the west end, which is slightly deeper ($\bar{Z}$=2 m) and has a soft black organic bottom (Kennedy 1962), and the south end, which is also deeper ($\bar{Z}$=3 m). Wave action in the shallow lake usually makes the water very turbid; however, the extreme west end, at the Kakisa River inflow, is relatively clear due to the heavy discharge of water from the river into the lake. The Cameron River, which drains into the south end of the lake, is the only other major tributary. Several small creeks, located around the lake, also drain into Tathlina Lake from the surrounding bog.

THE FISHERY

A gill net fishery for walleye commenced in 1954 with an annual quota of 91 000 kg and the minimum mesh size set at 114 mm (stretched measure). The quota and mesh size were based on economic rather than biological considerations and the presumption that no lasting harm could be done to the walleye stock. Once the fishery was established, adjustments could be made to obtain maximum sustainable yield. The initial annual quota of 91 000 kg remained in effect until 1967 when the quota was reduced to 30 900 kg. The minimum mesh size remained at 114 mm from 1951 until 1980 when it was reduced to 108 mm (stretched measure).

Domestic fishing has taken place on Tathlina Lake although the extent is unknown. Kennedy (1962) estimated the maximum annual fish requirements of the Indians in the area of Kakisa and Tathlina lakes to be less than 9 000 kg with the majority being taken from Kakisa Lake. Whitefish and walleye were the species generally taken. Today domestic fishing still occurs, although current estimates of the catch are not available. However, fishing is minimal and it is directed towards whitefish rather than walleye.

METHODS AND MATERIALS

COMMERCIAL FISHERY ASSESSMENT

Commercial production

Monthly summaries of walleye landings from Tathlina Lake have been compiled since 1954 by DFO staff in Hay River from sales slips. All data were recorded in pounds (round weight) until 1981 when the fishing industry in the Northwest Territories converted to the metric system. The landings were recorded by season commencing 01 November of one year through to 31 October of the subsequent year from 1954 to 1977. The fishing season was changed to commence 01 April of one year through to 31 March of the subsequent year from 1978 to 1986.

Biological evaluation

Sampling: Walleye from the commercial fishery were sampled by DFO staff at the fish plant in Hay River from 1975 to 1986. However, due to the low production and subsequent lack of availability of fish samples at the plant and/or the availability of a DFO sampler, commercial fish samples were not taken in 1977, 1978, 1984, and 1985. Boxes of fish were randomly selected from the catches of the various fishermen for sampling. All walleye in each selected box were examined. At least three boxes were sampled, unless fewer were available, to provide a minimum sample size of 215 fish and to reduce the bias that may arise due to site specific fishing.

Walleye were sampled for fork length (±1 mm), weight (±50 g), and aging structure (scales). Length was recorded as fork length when fish were sampled in the round (whole) form while the length of those fish sampled in the headless dressed (gutted) form was recorded and subsequently converted to fork length by the application of the following equation:

$$\text{Fork length} = 98.857 + 0.971\,(\text{Headless length}); \quad r = 0.79$$

Weight was recorded as round weight when fish were sampled in the round form. However, when fish were in the headless dressed form, weight was recorded and subsequently converted to round weight by the application of the following equation:

$$\text{Round weight} = 97.230 + 1.357\,(\text{Headless dressed weight}); \quad r = 0.85$$

The previous equations were derived from sampling 215 walleye in 1983 for fork length, round weight, dressed weight, and headless dressed length and weight and subsequently performing linear regression analysis on these data.

Scales were removed from the left side of the walleye from the area just posterior to the pectoral fin and below the lateral line and stored dry in coin envelopes. Scales were later mounted between two glass slides and the annuli counted on the image produced by an Eberbach microprojector (x60). Roberge et al. (1986) found no significant difference in aging walleye from nearby Kakisa Lake using scales compared to fins. Therefore variability in aging walleye from Tathlina Lake using scales is assumed to be minimal.

Length and age: Length and age frequencies were constructed to display catch composition by years. Duncan's multiple range test was used to determine significant differences ($p<0.05$) in mean age and mean length of catch between years.

Growth: Weight-length relationships were calculated using least squares regression on logarithmic transformations of fork length and round weights (or converted lengths and weights). Samples were initially compared between years and then pooled and compared among other locations. The relationships were described by the following equation:

$$\text{Log}_{10}W = a + b(\text{Log}_{10}L)$$

where W = weight in grams
L = fork length in millimeters

Mean fork length-at-age was plotted from samples taken in each year and visually compared. These data were then pooled, fitted by eye, and compared with growth curves from other locations.

Mortality: Instantaneous total mortality (Z) was calculated from the least squares regression line fitted to the descending limb of catch curves. Catch curves were fitted by eye and only that portion of the curve that appeared linear was included in the analysis. Ricker (1975) indicated that the modal age in the catch curve

will commonly lie quite close to the first year in which recruitment can be considered effectively complete. Therefore, only the next older and subsequent age groups from the modal age were used.

Annual survival rate (S) and annual mortality rate (A) were calculated from Z. Instantaneous natural mortality rate (M) was estimated to be 0.34 calculated from the annual natural mortality rate (v) which was assumed to be 0.20 (Smith and Pycha 1961; Shuter and Koonce 1977). Instantaneous fishing mortality rate (F) was calculated from the equation Z = F+M (Ricker 1975).

Rate of exploitation: The rate of exploitation (u) was calculated from the estimate of F as u = FA/Z after Ricker (1975), assuming that fishing and natural mortality operate concurrently.

POPULATION ASSESSMENT

Experimental netting

Experimental netting was conducted in Tathlina Lake in June, 1979 using standard gangs composed of panels of 47.5 m lengths each of 38, 64, 89, 114, and 139 mm mesh (stretched measure) nylon gill nets. A detailed description of the gill nets is given in Appendix 1. A gap of 3 m was left between each panel to reduce leading of fish from one mesh size to another. Set locations were restricted to the western end of the lake which corresponded to the area known to be utilized by commercial fishermen (Fig. 2). All sets made were bottom sets. The average set duration was 24 hours and always included an overnight period. The catch was recorded by mesh size and by species. Fish were sampled for later biological analysis. Catch per unit effort (CPUE) was estimated as number and weight (g) of fish caught per 91 m net per 24 hours.

Tagging

Walleye were captured from June 14-16, 1979 using small mesh gill nets (38 mm, 64 mm, and 89 mm mesh). Gill nets were set within Kakisa River at the inflow into Tathlina Lake in order to capture walleye congregated in the river mouth subsequent to spawning (Fig. 2). After capture walleye were placed in a measuring trough to obtain fork length. Floy (spaghetti) tags stamped with a reference number and return address were attached to 271 walleye using a Dennison (Model FDM-68) tagging gun. Tags were inserted near the base of the dorsal fin on the left side and anchored between the pterygiophores. Fish were then returned to the water and released. Tagged walleye proved extremely resilient after release. Walleye tagged in Mosquito Creek, NWT were retained for 6-54 h and no mortality or overt reactions to tagging were observed (Falk et al. 1980; unpublished data). Therefore initial survival of tagged walleye from Tathlina Lake was estimated to be 100 percent.

Biological evaluation

Sampling: All fish caught in the gill nets were sampled for fork length (±1 mm), round weight (±10 g), aging structure (scales), sex, and stage of maturity. Sex and relative stage of maturity were determined by examination of the gonads. Relative stage of maturity was coded according to the stages described in Appendix 2.

Scales were removed from the left side of the walleye from the area just posterior to the pectoral fin and from lake whitefish and northern pike as described by Hatfield et al. (1972a) and stored dry in coin envelopes. Burbot and sucker species were not aged. Scale ages were determined as described for the commercial walleye samples.

A qualitative analysis of the food types consumed by walleye caught from the experimental gill nets was made by examination of stomach contents. The food type was identified as either fish remains (species unknown), benthic invertebrates, zooplankton, or unidentifiable remains (Appendix 29).

Length and age: Length and age frequency histograms were constructed to display catch composition by mesh size and by year.

Growth: Weight-length relationships were calculated as described for the commercial walleye samples. Mean fork length-at-age was plotted from samples taken in different years and from different locations and growth rates were compared visually.

Fulton's condition factor (K), a measure of the plumpness of a fish (Ricker 1975), was determined using the following formula:

$$K = \frac{W \times 10^5}{L^3}$$

where W = weight in grams
L = fork length in millimeters

Mortality: Instantaneous total mortality (Z) was calculated from a least squares regression line fitted to the descending limb of the catch curve as described for the commercial walleye samples. Annual survival rate (S) and annual mortality rate (A) were calculated from Z.

DATA ANALYSIS

Data were analyzed using an Amdahl 5850 computer. The Statistical Analysis System (SAS) (1982) was used for regression, t-tests, and analysis of variance and for generating biological data summaries.

RESULTS AND DISCUSSION

COMMERCIAL FISHERY ASSESSMENT

Commercial production

Landings: Commercial landings of walleye since 1954 have annually averaged approximately 17 300 kg ranging from a low of 2 452 kg to a high of 55 181 kg (excluding 1978 harvest) (Table 1). The cyclic pattern in production is believed to be the result of fishing effort as well as to changes in walleye abundance (Fig. 3), however the extent of each of these factors is unknown. The noticeable harvesting in excess of the allotted quota in 1981 is the result of an administrative problem in reporting the remainder of the quota to be harvested.

The season in which the commercial fishery has taken place has varied from 1978 to 1986 (Fig. 4). Fishing has frequently taken place during the spring (April to June), however the percent of the total annual catch harvested for any one month has varied significantly from year to year. The largest recorded monthly catches (>4 000 kg) have been taken in the late fall and winter.

The areas normally fished are in and around the mouth of the inflowing Kakisa River often during the upstream and downstream spring spawning migrations (Fig. 2). During July fishing is concentrated near the river mouth where walleye are believed to be feeding. Fishing occurs primarily in the deeper open waters of the western end of the lake from August to October. Tag returns indicate that winter fishing is concentrated in the lower end of the river where walleye are believed to be overwintering (Table 2).

Yield: The extent of harvesting by the domestic fishery on Tathlina Lake is assumed to be minimal as based on historic information (Kennedy 1962; K. Roberts, DFO, Hay River, NWT, personal communications). The commercial yield ($kg \cdot ha^{-1}$) of walleye has ranged from 0.04 to 1.00 $kg \cdot ha^{-1}$ (excluding 1978) (Table 1). The average yield in the 1950's was low (0.10 $kg \cdot ha^{-1}$) as a result of a slow start to establishing a new commercial fishery due primarily to a lack of interest by local fishermen. Since that time the average yield was 0.39 $kg \cdot ha^{-1}$ from 1960-69, 0.26 $kg \cdot ha^{-1}$ from 1970-79, and 0.29 $kg \cdot ha^{-1}$ from 1980-86. It is interesting to note that since 1960 walleye yield has averaged >0.50 $kg \cdot ha^{-1}$ at the beginning of each decade followed by a significant decrease. The cause of the fluctuations in yield which appear to occur in a cyclic pattern are unknown. It may be that harvesting of walleye from Tathlina Lake at yields >0.50 $kg \cdot ha^{-1}$ cause a decrease in abundance resulting in subsequent lower yields. The effect on the changes in yield by fluctuations in effort as a result of the interest by commercial fishermen is not always known nor is the effect of changes in environmental conditions eg. winterkill. In comparison, the commercial yield of walleye from Kakisa Lake, which is on the same river system, averaged 0.58 $kg \cdot ha^{-1}$ during the 1980's (Roberge et al. 1986). Commercial walleye yields from five lakes in northern Saskatchewan averaged 0.88 $kg \cdot ha^{-1}$ (range = 0.4-1.6 $kg \cdot ha^{-1}$) (Rawson 1957a) and 0.20 $kg \cdot ha^{-1}$ for Lac la Ronge, Saskatchewan (Rawson 1957b). Koshinsky (1965) estimated an average yield of 0.33 $kg \cdot ha^{-1}$ (range 0.04-0.71 $kg \cdot ha^{-1}$) for five precambrian lakes near Lac la Ronge. Walleye yields calculated for 70 lakes in northern Ontario averaged 0.49 $kg \cdot ha^{-1}$ (Adams and Olver 1977). Adams and Olver (1977) determined that lakes in northern Ontario have a total percid sustainable yield of 1.00-1.25 $kg \cdot ha^{-1}$ for moderate to intensively fished lakes. The commercial yield of Tathlina Lake walleye is within the range for yields reported for other commercial fisheries however yields >0.50 kg/ha may result in overexploitation.

Biological evaluation

Length and age: Mean length of walleye from the commercial fishery from 1975 to 1986 ranged from 369 mm to 415 mm (Table 3) while modal length ranged from 360-369 mm to 420-429 mm (Fig. 5). Analysis of variance indicated a significant difference ($P<0.001$) in mean length ($F = 84.1$, 7 df) between years. Duncan's multiple range test performed on mean fork length for the years sampled indicated a significant difference in 1979, 1980, 1982, and 1986 ($P<0.001$) from all other years. There was a noticeable increase in the percent occurrence of fish ≤350 mm in 1980 and an increase at length intervals >410-450 mm in 1986 (Table 3).

Mean age of walleye ranged from 7.9 yr to 11.7 yr (Table 4). Modal age ranged from 8 yr to 12 yr (Fig. 6). Analysis of variance indicated a significant difference ($P<0.001$) in mean age ($F = 201.1$, 7 df) between years. Duncan's multiple range test indicated a significant difference for mean ages of walleye from 1975 to 1986. There is a noticeable shift in the age distribution since 1980 towards fish older than 11 yr and a concurrent decrease in fish 7 yr and younger (Table 4).

The results of sampling the commercial catch indicated a shift in distribution in the commercial harvest of walleye from 1975 to 1986 towards larger (Fig. 5) and older (Fig. 6) fish. The modal length shifted from 380-389 mm (1975) to 400-429 mm (1986). As well, the modal age increased from 8 yr to 11 yr during this same time period.

Colby and Nepszy (1981) state that an increase in mean age of a commercial catch can result from lack of recruitment or increased survival. The increase in mean age and continued decline in the presence of fish <8 yr from the Tathlina Lake commercial catch may be due in part to a lack of or variability in recruitment in the mid to late 1970's brought about by an increase in exploitation of walleye during the early 1970's when harvest levels averaged 29 500 kg (Table 1).

Bodaly (1980), Chevalier (1977), Derksen (1967), Koonce et al. (1977), Nelson and Walberg (1977), Olson and Scidmore (1962), Priegel (1970), and Spangler et al. (1977) indicated the

importance of spring water levels and flows, water temperature, and wind on walleye spawning success and on the timing of the runs. However, abiotic factors such as those listed above have not been quantified for the Tathlina Lake fishery, and therefore the extent, if any, of their contributions to the differences in the size and age composition of the commercial catch can not be assessed.

Smith and Pycha (1961) found that the extreme variation in yearly contribution of each age group of walleye to the commercial fishery from Red Lakes, Minnesota was the function of both the strength and growth history of different year classes. At least two strong year classes (1971 and 1972) in Tathlina Lake are apparent (Fig. 6) and may be a contributor to the increase in both size and age of walleye from 1979 to 1986. Alm (1977) found that one strong year class in perch populations remains dominant for several years. In the case of dystrophic lakes, a strong year class may remain predominant for approximately 15 years while in small eutrophic lakes it may be dominant for less than 10 years. Parsons (1970), Smith (1977), and Smith and Pycha (1961) noted that fluctuations in year class strengths contributed to variable walleye catches in southern fisheries. Busch et al. (1975) demonstrated that Lake Erie walleye spawning success on shoals was important in determining year class strength. Ward and Clayton (1975) also found that the age distribution of walleye from West Blue Lake (Manitoba) was unstable and probably reflected variations in yearly spawning success.

Studies have indicated that the sex ratio of walleye varies during the spawning runs (Rawson 1957b; Johnson 1971; Bodaly 1980). Falk et al. (1980) found that females caught in the fish weir in Mosquito Creek, NWT tended to be larger and older than males. Other studies have shown that males move onto the spawning grounds before females and remain there longer than females (Colby et al. 1979; Eschmeyer 1950; Rawson 1957b; Payne 1983; Preigel 1970; Bodaly 1980). The rate and timing of dispersal of adults after spawning varies, also (Eschmeyer 1950; Eschmeyer and Crowe 1955; Rawson 1957b; Forney 1963; Bidgood 1967; Bodaly 1980). The sex composition of walleye caught commercially may vary in some years when the Tathlina Lake fishermen fish the pre- and post-spawning runs at the mouth of the Kakisa River (Fig. 2). Unfortunately, the sex ratios of walleye in the commercial catches were not available.

The commercial harvest of walleye has been sampled since 1975. However, the time of sampling has varied greatly from February to October. This variation can result in differences in the size/age of the catch that was sampled. Fish sampled in April to June were harvested from the spawning migration while those in August to October were harvested from the open waters where the walleye should be more widely dispersed. Fish sampled in February were harvested from the segment of the population believed to be overwintering in the river mouth. In years when total annual production was >8 000 kg at least three different fishermen's catches were sampled in order to provide random sampling of fishermen and areas fished. However, when annual catch was low usually only one fishermen's catch was sampled. The extent of this variation in sampling is unknown and therefore the significance, if any, on the changes in size and age distributions found is undetermined.

Another factor often noted to cause changes in the size and age composition of the catch is a change in mesh size of the gill nets. Prior to 1981 the legal minimum mesh size utilized by the commercial fishery was 114 mm. In 1981 the mesh size was decreased to 108 mm, although during that year both 108 and 114 mm meshes were used. Subsequently, only 108 mm mesh has been utilized. However, with a decrease in mesh size an increase in mean length and age of the catch has occurred. Johnson (1976) states that size of fish taken in any mesh size is depndent not wholly on the mesh size to select any particular size group but on the fish present. Regardless of the decrease in mesh size, the availability of smaller (Table 2) and younger (Table 3) fish has decreased.

Growth: Comparison of the weight-length relationships for walleye by year is shown in Table 5. Round weights were compared by analysis of variance and were found to be significantly different ($P<0.05$).

Colby et al. (1979) suggests that the growth rate of adult walleye is affected by temperature and by food consumption. Food consumption in turn is related to forage abundance and density. Moenig (1975) observed an increase in walleye growth rate with exploitation while Colby et al. (1979) found that stocks undergoing heavy exploitation showed a rapid increase in growth which resulted in a severe decline in abundance.

Fulton's relative condition factor (K) of walleye ranged from 1.14 to 1.24 from 1975 to 1986 for those fish sampled in the round weight form. In comparison, Roberge et al. (1986) found K values ranging from 1.20 to 1.27 for walleye from Kakisa Lake. Colby et al. (1979) presents K values for walleye from various waters ranging from 0.81 to 1.85. Carlander (1944) indicates a K value >1.02 to signify that walleye are in excellent condition. Food availability appears to be the main factor in determining the condition of adult walleye (Colby et al. 1979).

Mortality: Total instantaneous mortality rates (Z), as derived from catch curves, are presented in Fig. 7. From 1975 to 1986 Z ranged from 0.90 to 1.83 (Table 6). In comparison, Z ranged from 0.64 to 1.19 for walleye from the Kakisa Lake commercial fishery (Roberge et al. 1986). Colby et al. (1979) found that Z ranged from 0.14 to 1.83 for walleye in various lakes but the common rates ranged from 0.51 to 0.80. Ney (1978) states that in exploited populations Z ranged as high as 0.85. If a constant natural instantaneous mortality rate of 0.34 is assumed then the changes in Z would be the result of changes in fishing mortality (F).

Instantaneous fishing mortality (F) ranged from 0.77 to 1.49 from 1975 to 1986 (Table 6). It averaged 0.87 from 1975 to 1981, excluding the F value of 1.19 in 1976. F increased in 1982-83 to an average of 1.32. These increases are believed to be the result of the large number of walleye harvested in 1981 and 1982. Changes in the fishing locations and seasons may have an effect on F, but these were not able to be evaluated. Roberge et al. (1986) determined the optimal instantaneous fishing mortality ($F_{0.1}$) of walleye from the Kakisa Lake commercial fishery to be an average 0.45. To reach this $F_{0.1}$ level for walleye from the Tathlina Lake fishery the yield of walleye would have to be reduced.

POPULATION ASSESSMENT

Experimental netting

A total of 259 fish were caught from four sets of experimental gill net gangs made in Tathlina Lake during 1979 (Fig. 2). Walleye (55.4%) and longnose sucker (Catostomus catostomus) (35.5%) composed 91% of the total catch (Table 7). Other species included lake whitefish, northern pike (Esox lucius), white sucker (Catostomus commersoni) and burbot (Lota lota). Overall catch per unit effort (CPUE) was 32.0 fish/91 m net/24 h. Compared to the catch composition in 1946 (Kennedy 1962) walleye still remains one of the dominant fish species in Tathlina Lake.

CPUE for walleye in 1979 ranged from 7.6 fish/91 m net/24 h in the 139 mm mesh to 204.7 fish/91 m net/24 h in the 64 mm mesh (Table 8). Availability of walleye by mesh size has changed since the start of commercial fishing in 1946. Comparison of catches in 1946 and 1979 shows an increase in CPUE in all the mesh sizes (Table 8). The lack of fish caught in 1946 using the larger meshes is probably due to the winter kill in 1942-43.

There is a significant difference ($P<0.05$) between mean lengths (Fig. 8) but not mean ages ($P>0.05$) of walleye (Fig. 9) caught by each mesh size. The modal length and age vary only slightly. Johnson (1976) states that this results from each mesh size having a minimum size of fish that it retains but no maximum. The small sample sizes of fish caught in the 114 mm and 139 mm mesh makes comparisons difficult. Johnson (1976) however, believed that the size of fish taken in any mesh size is dependent on the fish present rather than on the selectivity of the net.

The 64 mm mesh generally caught more than twice as many walleye as did other mesh sizes and therefore, it always contained the highest mean biomass (Fig. 10). Mean number of fish and mean biomass declined rapidly from the 64 mm to the 139 mm mesh. Frequency of immature walleye generally declined with an increase in mesh size (Table 9). The increase in percent frequency in the 139 mm mesh is not considered significant due to small sample sizes. Lysack (1980) found the percent of immature walleye from northern Lake Winnipeg declined with increasing mesh size as well. Unfortunately, no data are available on the mean number of fish, mean biomass, or the frequency of immature walleye caught in the 108 mm mesh, the gear currently utilized in the commercial fishery. However, it is assumed that these missing values would be less than those from the 114 mm mesh but greater than those for the 89 mm mesh. Therefore the legal minimum mesh size of 108 mm used in the Tathlina Lake commercial fishery is probably protecting the stocks pre-recruits which consists of small and immature fish. This fraction is required to sustain the reproductive capacity necessary for a sustainable commercial fishery.

Biological evaluation

Length, age, and maturity: Walleye caught by the experimental gill nets in 1979 ranged from 254 mm to 439 mm fork length (mean = 339 mm) (Table 10). In comparison, the mean length of walleye in 1946 was estimated to be 215 mm (Fig. 11). Modal lengths between 1946 and 1979 were significantly different: 200-224 mm in 1946 and 340-349 mm in 1979. Mean age of walleye in 1979 was 7.5 yr (Table 11). In comparison, the mean age of walleye in 1946 was 3.7 yr (Fig. 11). The small modal size and age in 1946 is attributed to the re-establishment of the stock subsequent to the winterkill of walleye during 1942/43.

Age at maturity varies considerably between walleye stocks and generally correlates inversely with growth rate (Colby et al. 1979). Northern stocks mature later and over a greater number of years than southern stocks (Colby et al. 1979). Heavily exploited stocks mature earlier than lightly or unexploited stocks (Wolfert 1969; Spangler et al. 1977). No mature walleye were found in the 2-5 yr age group of walleye caught in 1946 (Kennedy 1946). Comparison as to change in age of first maturity between 1946 and 1979 is impossible since only 2 fish in 1979 were aged younger than 6 yr. In 1979, walleye were first identified as mature at age 6 (Table 11) and 266 mm fork length (Table 10), 100% maturity of all walleye did not occur until age 9 and 384 mm fork length. In comparison, walleye from Kakisa Lake were first identified as mature at 4 yr and 166 mm fork length and 100% maturity occurred by age 10 and 394 mm fork length (Roberge et al. 1986). Forney (1965) found a trend toward an earlier maturity within the more rapidly growing walleye from Oneida Lake, New York. Rawson (1957b) reported that few walleye in Lac la Ronge, Saskatchewan, spawned at age 5 but the majority were mature at age 8-10 yr.

Scott and Crossman (1973) and Colby et al. (1979) report that male walleye mature at an earlier age than females. Male and female walleye in 1979 matured at least as young as age 6 (Table 11) and at 283 mm and 266 mm, respectively (Table 10). All male walleye were completely mature at age 9 and 344 mm while female were all mature at age 9 and 334 mm. In comparison, Roberge et al. (1986) found that male and female walleye from Kakisa Lake were mature as young as age 4 and all were mature by age 10. Bond et

al. (1978) reported that male walleye do not spawn before reaching age 7 and females before age 8 in the Hay River, Northwest Territories. During the spawning run of walleye into the Mosquito Creek, Northwest Territories from 1973-78, mature males ranged from 6-17 yr and females from 8-16 yr (Falk et al. 1980).

Growth: The weight-length relationship for walleye (sexes combined) from Tathlina Lake, 1979 was determined to be:

$$\log_{10}W = -4.518 + 2.831 \log_{10}L$$

There was no significant difference ($P>0.05$) between male and female walleye. Colby et al. (1979) also found no significant difference between the weight-length relationships of males and females in various other waters studied as did Roberge et al. (1986) for walleye from Kakisa Lake. No comparison could be made with those caught in 1946 due to the differences in the data recording formats. Growth rate for Tathlina Lake walleye is compared with that of other walleye populations (Fig. 12). Tathlina Lake walleye are slow growing. Their growth is slightly faster than that for walleye from Kakisa Lake, NWT (Roberge et al. 1986) until approximately age 8, but lower than that found for walleye from southern populations. Colby et al. (1979) found that the growth rate of walleye decreases with increasing latitude. They also found that growth may be affected by temperature, forage abundance, and population density.

Mean condition factor (K) was 1.06 in 1979; 1.03 for males and 1.08 for females (Table 10). These values are only slightly lower than those found for Kakisa Lake walleye (Roberge et al. 1986).

Mortality: Catch curve analysis indicated a good fit to the regression line fitted to that portion of the descending limb of the curve considered, by visual observation, to be linear (Fig. 13). Fluctuations in the descending limb are probably due to variability in recruitment. Instantaneous total mortality (Z), calculated from the slope of the straight line fitted to the data, was estimated to be 1.61. In comparison the Z for walleye from Kakisa Lake was estimated to be 0.80 in 1978 (Roberge et al. 1986). Annual survival rate (S) is low at 0.20. In comparison, instantaneous total mortality rate (Z) was 1.79 in 1946 and S was 0.17 (Kennedy 1962).

CONCLUSIONS

Commercial production of walleye from Tathlina Lake has fluctuated since the establishment of the fishery in 1954. The cyclic pattern in commercial production from 1954 to 1985 is attributed to variations in fishing effort and changes in walleye abundance; the extent of each is unknown.

Since 1975 the biological sampling of the commercial catch has provided information on the harvest and biological status of the exploited segment of the walleye population. However, the interpretation of the changes in the size and age data have been hampered by both variations in the time of annual sampling and location of fishing. Heavy fishing may have a detrimental effect on the Tathlina Lake walleye stock, especially at yields >0.50 kg/ha. The mean and modal sizes of walleye have increased over the last decade, however the mean and modal ages have significantly increased. This increase in size and age is probably the result of recruitment failures as evidenced in the continual decline in the occurrence of fish <10 yr as well as the presence of 1-2 strong year classes; the extent for impact of each is not known. . The differences between years may also be the result of changes in the timing and location of fishing and/or environmental conditions such as water temperature and flow, etc. If a constant natural mortality is assumed, fluctuations in instantaneous total mortality are considered due to changes in fishing mortality. These changes may also be due to over-exploitation by harvesting large catches of walleye and/or to changes in the fishing locations and seasons. The effect of the mesh size change on fishing mortality is probably not significant. The effect on the fishing mortality by the domestic fishery is unknown but it is believed to be minimal.

The winterkill of 1942-43 makes comparisons between walleye sampled in 1946 and 1979 difficult. As well, estimation of the various population parameters may have been effected by the limited spatial sampling carried out in 1979 because experimental gill netting was only conducted in the west end of the lake.

The decrease in mesh size from 114 mm to 108 mm does not appear to have had any significant effect on the exploited segment of the population. Unfortunately, information as to the frequency of immature walleye caught by the 108 mm mesh is unavailable. Assuming that it would be less than that found for the 114 mm mesh but greater than that for the 89 mm mesh; it is believed that the minimum mesh size of 108 is protecting the pre-recruits.

Heavy exploitation of a fish stock was often believed to result in a decline in mean size and age of the catch (Colby et al. 1979). However, it has been found that for northern fish populations such as Arctic charr, lake trout and lake whitefish, these indicators of over-exploitation are not apparent until "after the fact" and a too high exploitation rate has been imposed on the population (L. Johnson, DFO, Winnipeg, Manitoba, personal communication). Since Tathlina Lake walleye are close to their northern limit in the NWT and its habitat is likely susceptible to environmental changes due to the lakes' shallow depth, walleye are probably in a delicate balance with their ecosystem and thus highly susceptible to over-exploitation.

It is believed that commercial exploitation has had a significant impact on the Tathlina Lake walleye population. When compared to the adjacent commercial walleye fishery in Kaki-

sa Lake (Roberge et al. 1986), the age and size of 100% maturity is lower as is the condition factor, growth rate is at least similar while the instantaneous total mortality rate is significantly higher. Despite the fact that the harvest from the commercial fishery over the past three years has been low due to a lack of interest it is felt that conservation measures should be in place before the interest in commercial fishing resumes.

The pre-recruit fraction of the population appears to be protected by the minimum mesh size of 108 mm. However, in an attempt to reduce the mortality rate and to ensure that the walleye population is not subjected to over-exploitation the total allowable catch (TAC) should be reduced. Previous harvests at or above the current quota of 30 900 kg probably had a deleterious effect on the population, therefore annual yield should be below 0.50 kg/ha. If the theoretical optimum fishing rate ($F_{0.1}$) of 0.45 derived for the adjacent Kakisa Lake walleye fishery (Roberge et al. 1986) is used in the Baranov catch equation (Ricker 1975) then the quota should be <15 000 kg. However, this estimate should only be used as a guideline in determining the TAC. Therefore, considering the past history of the fishery and using the above estimate as a guideline, the commercial TAC should not exceed 20 000 kg.

MANAGEMENT RECOMMENDATIONS

1. Total allowable catch (TAC) for the commercial fishery should be decreased from 30 900 kg to 20 000 kg to protect the walleye population from over-exploitation.

2. Annual monitoring and biological sampling of the commercial catch should continue to provide information on the status of the exploited walleye stock. Biological sampling should be conducted during the same time period annually, if possible, to reduce the effects of variations in the data caused by the time of fishing and the location of fishing. In addition, samples should be taken each time the fishery changes location and fishing season.

3. Annual monitoring of the domestic fishery harvest, if any, should be initiated to provide a current estimate.

4. The TAC should be reviewed within five years and adjustments made pending any observed changes in fishing strategies and stock composition.

5. General research into the population dynamics of walleye in its northern range is needed including the effects of exploitation.

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REFERENCES

ADAMS, G.F., and C.H. OLVER. 1977. Yield properties and structure of boreal period communities in Ontario. J. Fish. Res. Board Can. 34: 1613-1625.

ALM, G. 1977. A review of pikeperch (Stizostedion lucioperca), Eurasian perch (Perca fluviatilis), and ruff (Gymnocephalus cernua) in Finland. J. Fish. Res. Board Can. 34(10): 1684-1695 (cited in Lund 1977).

BIDGOOD, B.F. 1967. Ecology of walleyes in Richardson Lake - Lake Athabasca. Alberta Fish. Wildl. Div. Fish. Sect. Res. Rep. 1: 20 p.

BODALY, R.A. 1980. Pre- and post-spawning movements of walleye, Stizostedion vitreum, in Southern Indian Lake, Manitoba. Can. Tech. Rep. Fish. Aquat. Sci. 931: v + 30 p.

BOND, W.A., R.W. MOSHENKO, and G. LOW. 1978. An investigation of walleye, Stizostedion vitreum vitreum (Mitchill), from the sport fishery of the Hay River, Northwest Territories, 1975. Can. Fish. Mar. Serv. Manuscr. Rep. 1449: v + 19 p.

BUSCH, W.D.N., R.L. SCHOLL, and W.L. HARTMAN. 1975. Environmental factors affecting the strength of walleye (Stizostedion vitreum vitreum) year-classes in western Lake Erie, 1960-70. J. Fish. Res. Board Can. 32: 1733-1743.

CARLANDER, K.D. 1944. Notes on the coefficient of conditions, K, of Minnesota fishes. Invest. Rep. Minn. Bar. Fish. 41: 40 p.

CARLANDER, K.D. 1977. Biomass, production, and yields of walleye (Stizostedion vitreum vitreum) and yellow perch (Perca flavescens) in North American lakes. J. Fish. Res. Board Can. 34: 1602-1612.

CHEVALIER, J.K. 1977. Changes in walleye (Stizostedion vitreum vitreum) population in Rainy Lake and factors in abundance, 1924-75. J. Fish. Res. Board Can. 34: 1696-1702.

COLBY, P.J., R.E. McNICOL, and R.A. RYDER. 1979. Synopsis of biological data on the walleye Stizostedion v. vitreum (Mitchill 1818). FAO Fish. Synop. 119: 139 p.

COLBY, P.J., and S.J. NEPSZY. 1981. Variations among stocks of walleye (Stizostedion vitreum vitreum): management implications. Can. J. Fish. Aquat. Sci. 38: 1814-1831.

DERKSEN, A.J. 1967. Variations in abundance of walleyes (Stizostedion vitreum vitreum (Mitchell), in Cedar and Moose Lakes, Manitoba. M.Sc. Thesis. University of Manitoba, Winnipeg, MB. 98 p.

ENVIRONMENT CANADA. 1980. Historical streamflow summary. Yukon and Northwest Territories. Inland Waters Directorate, Water Survey of Canada, Ottawa, ON. xii + 96 p.

ESCHEMEYER, P.H. 1950. The life history of the walleye in Michigan. Mich. Dep. Conserv. Inst. Fish. Res. Bull. 5: 99 p.

ESCHEMEYER, P.H., and W.R. CROWE. 1955. The movement and recovery of tagged walleyes in Michigan, 1929-1953. Mich. Dep. Conserv. Inst. Fish. Res. Misc. Publ. 8: 32 p.

FALK, M.R., and L.W. DAHLKE. 1975. Creel and biological data from streams along the south shore of Great Slave Lake, 1971-74. Can. Fish. Mar. Serv. Data Rep. Ser. CEN/D-75-8: 87 p.

FALK, M.R., D.V. GILLMAN, and C.J. READ. 1980. The walleye, Stizostedion vitreum vitreum (Mitchill), sport fishery on Mosquito Creek, Northwest Territories, 1973-78. Can. Manuscr. Rep. Fish. Aquat. Sci. 1559: v: 29 p.

FORNEY, J.L. 1963. Distribution and movement of marked walleyes in Oneida Lake, New York. Trans. Am. Fish. Soc. 92: 47-52.

FORNEY, J.L. 1965. Factors affecting growth and maturity in a walleye population. N.Y. Fish. Game J. 12(2): 217-232.

HATFIELD, C.T., J.N. STEIN, M.R. FALK, and C.S. JESSOP. 1972a. Fish resources of the Mackenzie River Valley. Interim Report I. Vol. I. Canada, Department of the Environment, Fisheries Service, Winnipeg, MB. 247 p.

HATFIELD, C.T., J.N. STEIN, M.R. FALK, C.S. JESSOP, and D.N. SHEPARD. 1972b. Fish resources of the Mackenzie River Valley. Interim Report I. Vol. II. Canada, Department of the Environment, Fisheries Service, Winnipeg, MB. 287 p.

INVENTORY OF CANADIAN FRESHWATER LAKES. 1969. Compiled by Inland Waters Branch, Department of Energy, Mines and Resources, Ottawa.

JESSOP, C.S., T.R. PORTER, M. BLOUW, and R. SOPUCK. 1973. Fish resources of the Mackenzie River valley: an intensive study of the fish resources of two mainstream tributaries. Prepared by Department of the Environment, Fisheries Service, for Task Force on Northern Oil Development. Environmental-Social Committee, Northern Pipelines. 148 p.

JESSOP, C.S., K.T.J. CHANG-KUE, J.W. LILLEY, and R.J. PERCY. 1974. A further evaluation of the fish resources of the Mackenzie River Valley as related to pipeline development. Task Force on Northern Oil Development, Environmental-Social Committee Northern Pipelines Report 74-7: 95 p.

JESSOP, C.S., and J.W. LILLEY. 1975. An evaluation of the fish resources of the Mackenzie River valley based on 1974 data. Can. Fish. Mar. Serv. Tech. Rep. Ser. CEN/T-75-6: 97 p.

JOHNSON, F.H. 1971. Numerical abundance, sex ratios, and size-age composition of the walleye spawning run at Little Cut Foot Sioux Lake, Minnesota 1942-1969, with data on fecundity and incidence of Lymphocystis. Minn. Dep. Nat. Resour. Div. Fish. Game Sect. Fish. Invest. Rep. 315: 3 p.

JOHNSON, L. 1976. Ecology of arctic populations of lake trout, Salvelinus namaycush, lake whitefish, Coregonus clupeaformis, Arctic char, S. alpinus, and associated species in unexploited lakes of the Canadian Northwest Territories. J. Fish. Res. Board Can. 33: 2459-2488.

KENNEDY, W.A. 1962. A report on Tathlina and Kakisa lakes, 1946. Fish. Res. Board Can. Manuscr. Rep. Series (Biol.) 721: 24 p.

KOSHINSKY, G.D. 1965. Limnology and fisheries of five precambrian headwater lakes near Lac la Ronge, Saskatchewan. Sask. Dep. Nat. Resour. Fish. Rep. 7: 52 p.

KOONCE, J.F., T.B. BAGENAL, R.F. CARLINE, K.E.F. HOKANSON, and M. NAGIEC. 1977. Factors influencing year-class strength of percids: a summary and a model of temperature effects. J. Fish. Res. Board Can. 34: 1900-1909.

LILLEY, J.W. 1975. Aquatic resources data summary for Willowlake River, River Between Two Mountains, Hare Indian, Travaillant and Rengleng Rivers, N.W.T. Can. Fish. Mar. Serv. Data Rep. Series CEN/D-75-6: 29 p.

LYSACK, W. 1980. 1979 Lake Winnipeg fish stock assessment program. Man. Dep. Nat. Resour. Res. MS Rep. 80-30: xiv + 118 p.

MILLER, R.B. 1947. Great Bear Lake, p. 31-44 In North West Canadian fisheries surveys 1944-1945. Bull. Fish. Res. Board Can. 72.

MOENIG, J.T. 1975. Dynamics of an experimentally exploited walleye population in Dexter Lake, Ontario. M. Sc. Thesis, University of Toronto, Toronto, ON. 198 p.

NELSON, W.R., and C.H. WALBURG. 1977. Population dynamics of yellow perch (Perca flavescens), sauger (Stizostedion canadense) and walleye (S. vitreum vitreum) in four main stem Missouri River reservoirs. J. Fish. Res. Board Can. 34: 1748-1763.

NEY, J.J. 1978. A synoptic review of yellow perch and walleye biology, p. 1-12. In R.L. Kendall (ed.) Selected coolwater fishes of North America. Am. Fish. Soc. Spec. Publ. 11.

OLSON, D.E., and W.J. SCIDMORE. 1962. Homing behavior of spawning walleyes. Trans. Am. Fish. Soc. 91: 355-361.

PARSONS, J.W. 1970. Walleye fishery of Lake Erie in 1943-62 with emphasis on contributions of the 1942-61 year-classes. J. Fish. Res. Board Can. 27: 1475-1489.

PAYNE, N.R. 1963. The life history of the walleye, Stizostedion vitreum vitreum (Mitchill), in the Bay of Quinte. M.A. Thesis, University of Toronto, Toronto, ON. 40 p.

PREIGEL, G.R. 1970. Reproduction and early life history of the walleye in the Lake Winnebago region. Tech. Bull. Wisc. Dep. Nat. Resour. 47: 28 p. (cited in Colby et al. 1979).

RAWSON, D.S. 1947. Great Slave Lake, p. 45-85. In North West Canadian fisheries surveys in 1944-1945. Bull. Fish. Res. Board Can. 72.

RAWSON, D.S. 1951. Studies of the fish of Great Slave Lake. J. Fish. Res. Board 8: 207-240.

RAWSON, D.S. 1957a. Limnology and fisheries of five lakes in the Upper Churchill drainage, Saskatchewan. Sask. Dep. Nat. Resour. Fish. Rep. 3: 61 p.

RAWSON, D.S. 1957b. The life history and ecology of the yellow walleye, Stizostedion vitreum. in Lac la Ronge, Saskatchewan. Trans. Am. Fish. Soc. 86: 15-37.

RICKER, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Bull. Fish. Res. Board Can. 191: 382 p.

ROBERGE, M.M., G. LOW, and C.J. READ. 1986. An assessment of the commercial fishery and population structure of walleye in Kakisa Lake, Northwest Territories, 1977-1985. Can. Tech. Rep. Fish. Aquat. Sci. 1435: v + 59 p.

SCOTT, W.B., and E.J. CROSSMAN. 1973. Freshwater fishes of Canada. Fish. Res. Board Can. Bull. 184: 966 p.

SHUTER, B.J., and J.F. KOONCE. 1977. A dynamic model of the western Lake Erie walleye (Stizostedion vitreum vitreum) population. J. Fish. Res. Board Can. 34: 1972-1982.

SMITH, L.L. 1977. Walleye (Stizostedion vitreum vitreum) and yellow perch (Perca flavescens) populations and fisheries of the Red Lakes, Minnesota, 1930-75. J. Fish. Res. Board Can. 34: 1774-1783.

SMITH, L.L., and R.L. PYCHA. 1961. Factors related to commercial production of the walleye in Red Lakes, Minnesota. Trans. Am. Fish. Soc. 90(2): 190-217.

SPANGLER, G.R., N.R. PAYNE, J.E. THORPE, J.M. BYRNE, H.A. REGIER, and W.V. CHRISTIE. 1977. Response of percids to exploitation. J. Fish. Res. Board Can. 34: 1983-1988.

STATISTICAL ANALYSIS SYSTEM (SAS) INSTITUTE INC. 1982. SAS user's guide: Basics, 1982 edition. Cary, N.C. 923 p.

STEIN, J.N., C.S. JESSOP, T.R. PORTER, and K.T.J. CHANG-KUE. 1973a. Fish resources of the Mackenzie River valley. Interim Report II. Prepared by Department of the Environment, Fisheries Service, for Task Force on Northern Oil Development, Environmental-Social Committee, Northern Pipelines. 260 p.

STEIN, J.N., C.S. JESSOP, T.R. PORTER, and K.T.J. CHANG-KUE. 1973b. An evaluation of the fish resources of the Mackenzie River Valley as related to pipeline development. Vol. I. Task Force on Northern Oil Development Environmental Social Committee, Northern Pipelines Report 73-1: 121 p.

WARD, F.J., and J.W. CLAYTON. 1975. Initial effects of fry introductions on year-class strengths of West Blue Lake walleye, Stizostedion vitreum vitreum (Mitchill), using fry with distinctive malate dehydrogenase isozyme phenotypes as an identifying mark. Int. Ver. theor. angew. Limnol. Verh. 19: 2394-2400.

WOLFERT, D.R. 1969. Maturity and fecundity of walleyes from the eastern and western basins of Lake Erie. J. Fish. Res. Board Can. 26: 1877-1888.

Table 1. Annual catch and yield of walleye from the commercial fishery, Tathlina Lake, 1954-1986.

Season[1]	Annual Quota (kg)	Catch (kg)	Yield ($kg \cdot ha^{-1}$)
1954	91 000	4 200	0.08
1955	"	-	-
1956	"	-	-
1957	"	-	-
1958	"	6 334	0.11
1959	"	6 488	0.12
1960	"	47 746	0.86
1961	"	26 194	0.47
1962	"	55 181	1.00
1963	"	30 488	0.55
1964	"	10 693	0.19
1965	"	13 106	0.24
1966	"	9 979	0.18
1967	30 900	10 338	0.19
1968	"	6 639	0.12
1969	"	10 962	0.20
1970	"	17 988	0.32
1971	"	18 327	0.33
1972	"	30 209	0.55
1973	"	28 845	0.52
1974	"	8 339	0.15
1975	"	9 426	0.17
1976	"	14 487	0.26
1977	"	2 452	0.04
1978[2]	"	144	<0.01
1979	"	2 486	0.04
1980	"	5 244	0.09
1981	"	45 674	0.80
1982	"	30 643	0.53
1983	"	19 616	0.34
1984	"	7 609	0.13
1985	"	4 220	0.07
1986	"	3 641	0.06

[1] Season extends from 01 November of the previous year to 31 October of the year listed.

[2] Season changed to extend from 01 April of the year listed to 31 March of the subsequent year.

Table 2. Information on the location of recaptured walleye from Tathlina Lake tagged in June, 1979.

Number	Date Recaptured (dy/mth/yr)	Location	Site Number	Distance from Tagging to Recapture Site (km)
1	30/06/79	Cameron River area	3	46
2	30/06/79	Cameron River area	3	46
3	06/07/79	Cameron River area	3	46
4	06/07/79	Cameron River area	3	46
5	06/07/79	Cameron River area	3	46
6	17/04/80	West end	2	5
7	20/04/80	West end	2	5
8	05/05/80	West end	2	5
9	10/04/81	West end	2	5
10	10/04/81	West end	2	5
11	15/11/81	Kakisa River[1]	1	6
12	15/12/81	Kakisa River	1	6
13	15/12/81	Kakisa River	1	6
14	15/12/81	Kakisa River	1	6
15	15/12/81	Kakisa River	1	6
16	15/12/81	Kakisa River	1	6
17	07/01/82	Kakisa River	1	6
18	15/02/82	Kakisa River	1	6
19	15/02/82	Kakisa River	1	6
20	15/03/82	Kakisa River	4	0

[1]Kakisa River - inflow to Tathlina Lake.

Table 3. Mean length and length frequency (percent) of walleye from the commercial fishery, Tathlina Lake, 1975-86.

Year	No. of Fish	Mean Length (mm)	Percent Length (mm)				
			≤350	360-400	410-450	460-500	>500
1975	98	396	-	72	28	-	-
1976	195	398	5	65	29	1	-
1977	-	-	-	-	-	-	-
1978	-	-	-	-	-	-	-
1979	50	392	2	78	20	-	-
1980	194	369	33	63	3	1	-
1981	136	396	2	75	23	-	-
1982	215	411	-	47	53	<1	-
1983	208	398	<1	82	17	-	-
1984	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-
1986	210	415	1	40	56	2	1

Table 4. Mean age and age frequency (percent) of walleye from the commercial fishery, Tathlina Lake, 1975-86.

Year	No. of Fish	Mean Age (yr)	Percent Age (yr)					
			≤7	8	9	10	11	≥12
1975	94	8.4	19	36	27	14	3	1
1976	190	7.9	30	33	28	5	2	1
1977	-	-	-	-	-	-	-	-
1978	-	-	-	-	-	-	-	-
1979	44	8.2	16	64	14	-	2	5
1980	177	8.9	9	55	77	24	9	3
1981	124	9.4	6	19	42	39	15	3
1982	204	10.9	-	<1	4	28	44	23
1983	198	10.5	1	2	12	35	37	14
1984	-	-	-	-	-	-	-	-
1985	-	-	-	-	-	-	-	-
1986	120	11.7	2	3	5	5	29	57

Table 5. Weight-length relationships for walleye from the commercial fishery, Tathlina Lake, 1975-1986.

Year	N	Y-intercept (a)	Slope (b)	Standard Error of b (S_b)
1975[1]	97	-4.547	2.876	0.142
1976	300	-3.534	2.457	0.034
1977	-	-	-	-
1978	-	-	-	-
1979[1]	49	-3.003	2.226	0.181
1980	193	-5.149	3.080	0.076
1981	135	-4.925	3.002	0.119
1982	214	-4.439	2.820	0.096
1983[1]	207	-3.716	2.549	0.146
1984	-	-	-	-
1985	-	-	-	-
1986	208	-4.045	2.659	0.077

[1]Converted lengths and weights.

Table 6. Instantaneous total and fishing mortality, exploitation, and annual survival rates of walleye from the commercial fishery, Tathlina Lake, 1975-1986.

Year	Age (yrs)	Instantaneous Total Mortality (catch curve) Z	Instantaneous Fishing Mortality (Z-0.34) F	Exploitation $(1-e^{-F})$ u	Annual Survival S
1975	9-12	1.11	0.77	0.54	0.33
1976	9-11	1.53	1.19	0.70	0.22
1977	-	-	-	-	-
1978	-	-	-	-	-
1979	9-11	0.90	0.56	0.43	0.41
1980	10-12	1.24	0.90	0.59	0.29
1981	10-12	1.28	0.94	0.61	0.28
1982	12-14	1.83	1.49	0.77	0.16
1983	12-13	1.48	1.14	0.68	0.23
1984	-	-	-	-	-
1985	-	-	-	-	-
1986	13-16	1.21	0.87	0.58	0.30

Table 7. Catch and catch per unit effort (CPUE) for fish caught by experimental gill nets, Tathlina Lake, 1979.

		Mesh Size (mm)						
		38	64	89	114	139	Total	CPUE[1]
Walleye	No.	57	403	213	10	15	698	17.7
	%	8.2	57.7	30.5	3.3	2.2	55.4	
Longnose sucker	No.	9	71	171	176	20	447	11.4
	%	2.0	15.9	38.3	39.4	4.5	35.5	
Lake whitefish	No.	9	16	17	12	8	62	1.6
	%	14.5	25.8	27.4	19.4	12.9	4.9	
Northern pike	No.	11	27	4	-	-	42	1.1
	%	26.2	64.3	9.5	-	-	3.3	
White sucker	No.	1	-	3	2	1	7	0.2
	%	14.3	-	42.9	28.6	14.3	0.6	
Burbot	No.	-	-	-	2	1	3	<0.1
	%	-	-	-	66.7	33.3	0.2	
Total	No.	87	517	408	202	45	1 259	32.0
	%	6.9	41.1	32.4	16.0	3.6		

[1]No. fish per 91 m of gill net per 24 h.

Table 8. Catch per unit effort (no. fish/91 m net/24 h) by mesh size for walleye caught by experimental gill nets, Tathlina Lake, 1946 and 1979.

Year	Mesh Size (mm)					
	38	64	89	114	120	139
1946 (Kennedy 1962)[1]	26.0	20.0	-	-	0.0	0.0
1978 (this study)	29.0	204.7	108.2	5.1	-	7.6

[1]Assume an overnight set = 12 h.

Table 9. Percent occurrence by mesh size for immature male and female walleye caught by experimental gill nets, Tathlina Lake, 1979.

Sex		Mesh Size (mm)				
		38	64	89	114	139
Male	No.	17	182	53	3	3
	% Immature	0.6	13.7	3.8	0.0	0.0
Female	No.	37	209	155	7	11
	% Immature	8.1	5.7	1.9	0.0	9.1
Combined	No.	54	391	208	10	14
	% Immature	7.4	9.5	2.4	0.0	7.1

Table 10. Biological data by length interval for walleye caught by experimental gill nets, Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
250	-	-	-	-	-	-	1	254	180	-	1.10	0	1	254	180	-	1.10	0
260	1	266	200	-	1.06	0	3	266	207	12	1.10	33	5	266	208	11	1.10	20
270	6	277	220	25	1.04	0	1	275	200	-	0.96	0	10	276	216	21	1.03	0
280	8	283	245	23	1.08	25	11	284	245	18	1.07	55	22	284	245	19	1.07	36
290	7	293	266	22	1.05	57	14	294	269	15	1.06	79	24	294	271	25	1.07	63
300	15	304	292	15	1.04	80	16	304	294	19	1.04	75	35	304	292	18	1.04	69
310	37	314	315	15	1.01	86	18	315	330	24	1.06	94	57	314	320	20	1.03	86
320	55	325	348	23	1.02	95	35	324	370	22	1.08	94	90	324	356	25	1.04	94
330	36	334	387	29	1.04	97	56	334	405	29	1.09	100	93	334	398	30	1.07	98
340	28	344	428	34	1.05	100	71	344	450	28	1.10	100	99	344	444	31	1.09	100
350	19	354	466	31	1.05	100	68	354	482	32	1.09	100	88	354	479	33	1.08	99
360	24	364	504	33	1.05	100	60	364	522	26	1.08	100	84	364	517	29	1.07	100
370	11	375	536	40	1.02	100	32	373	550	31	1.06	100	44	374	546	34	1.05	98
380	7	383	574	22	1.02	100	19	384	596	27	1.06	100	26	384	590	27	1.05	100
390	2	393	560	57	0.93	100	7	394	597	41	0.98	100	9	393	589	44	0.97	100
400	-	-	-	-	-	-	5	404	634	46	0.96	100	5	404	634	46	0.96	100
410	1	415	740	-	1.04	100	-	-	-	-	-	-	1	415	740	-	1.04	100
420	1	426	820	-	1.06	100	1	420	740	-	1.00	100	2	423	780	57	1.03	100
430	-	-	-	-	-	-	1	439	660	-	0.78	100	1	439	660	-	0.78	100
TOTAL	258						419						696					
MEAN		333	387	97	1.03			345	447	99	1.08			339	421	104	1.06	

Table 11. Biological data by age group for walleye caught by experimental gill nets, Tathlina Lake, 1979.

AGE (YR)	MALES							FEMALES							COMBINED					
		LENGTH(MM)		WEIGHT(G)			%		LENGTH(MM)		WEIGHT(G)			%		LENGTH(MM)		WEIGHT(G)			%
	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT
5	1	278	-	240	-	1.12	0	-	-	-	-	-	-	-	2	283	6.4	250	14	1.11	0
6	20	299	21.6	286	59	1.06	50	18	295	28.3	286	94	1.08	56	41	296	24.6	283	75	1.07	49
7	54	330	22.0	381	88	1.04	89	90	341	23.9	433	93	1.08	98	150	336	24.0	410	95	1.06	91
8	58	346	21.1	433	81	1.04	98	155	355	17.6	491	69	1.09	99	215	353	19.0	475	76	1.08	98
9	8	370	14.0	525	56	1.03	100	17	376	15.1	558	64	1.04	100	25	374	14.8	547	63	1.04	100
10	2	390	35.4	630	156	1.05	100	1	388	-	600	-	1.03	100	3	389	25.0	620	111	1.04	100
11	-	-	-	-	-	-	-	1	439	-	660	-	0.78	100	1	439	-	660	-	0.78	100
TOTAL	143							282							437						
MEAN		335	28	400	103	1.04			349	26.9	464	98	1.08			343	28.7	439	105	1.07	
MEAN AGE	7.5																				

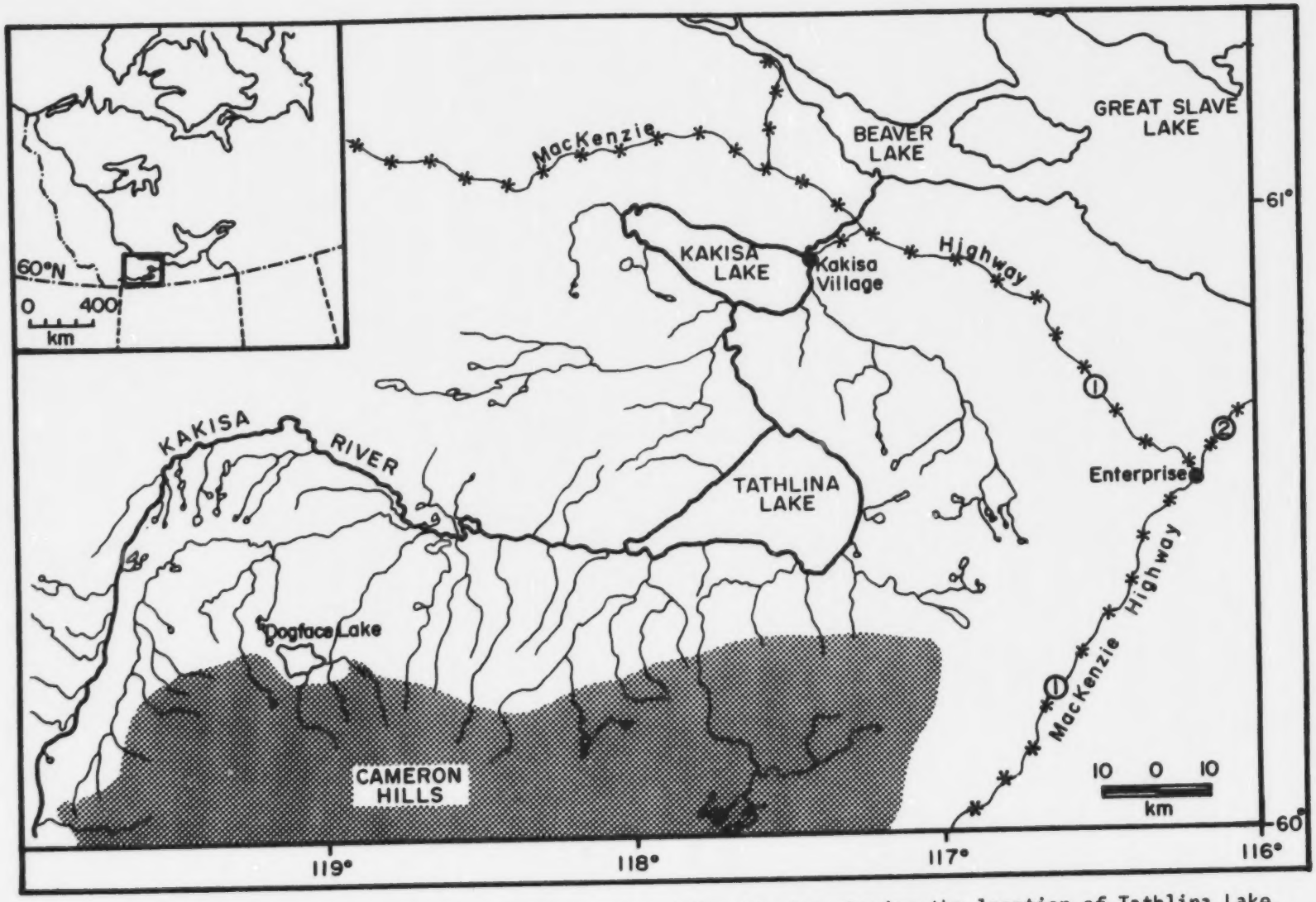

Fig. 1. Map of the southwest portion of the Northwest Territories showing the location of Tathlina Lake.

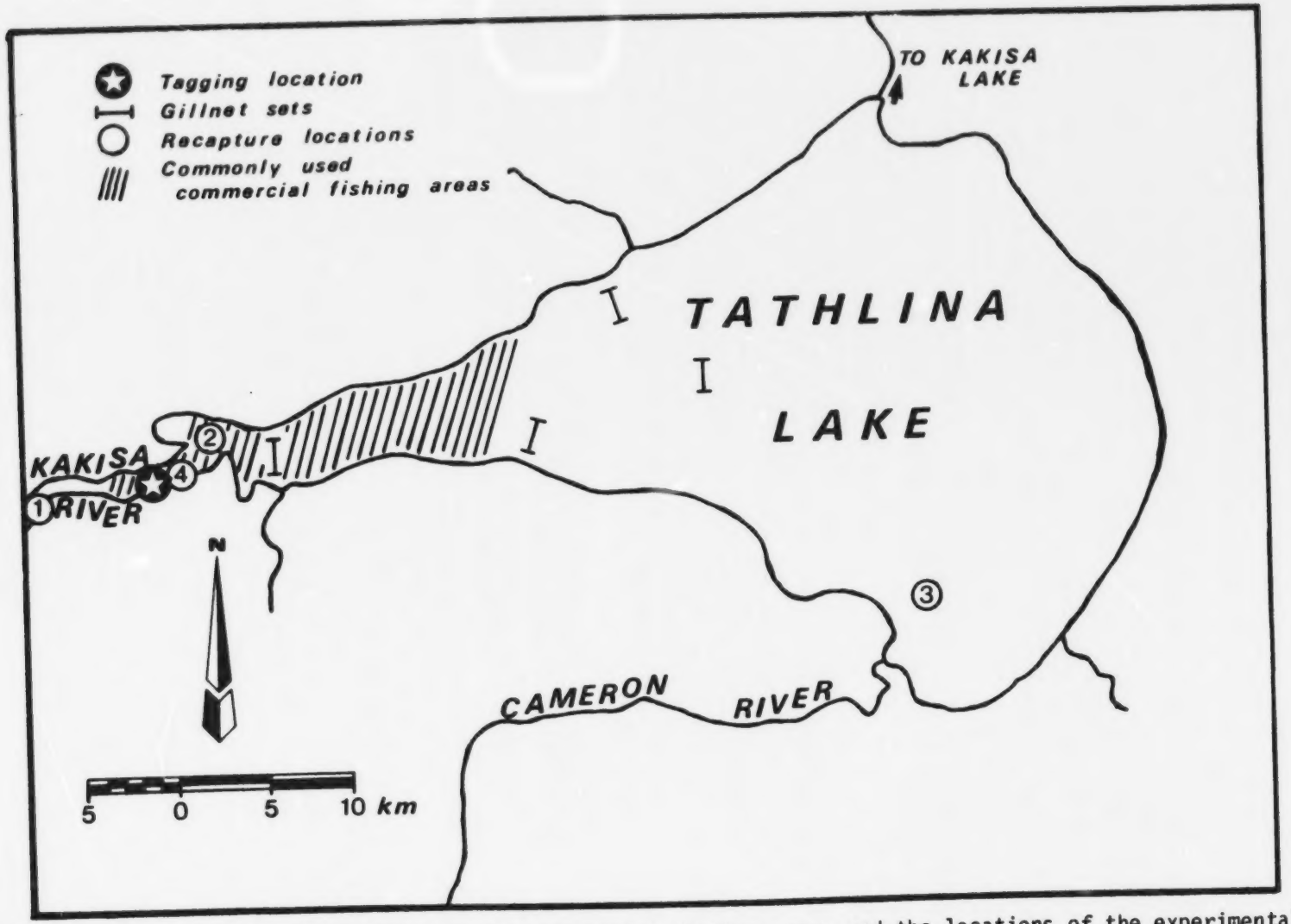

Fig. 2. Map of Tathlina Lake depicting the commercial fishing areas and the locations of the experimental gillnet sets and tagging sites.

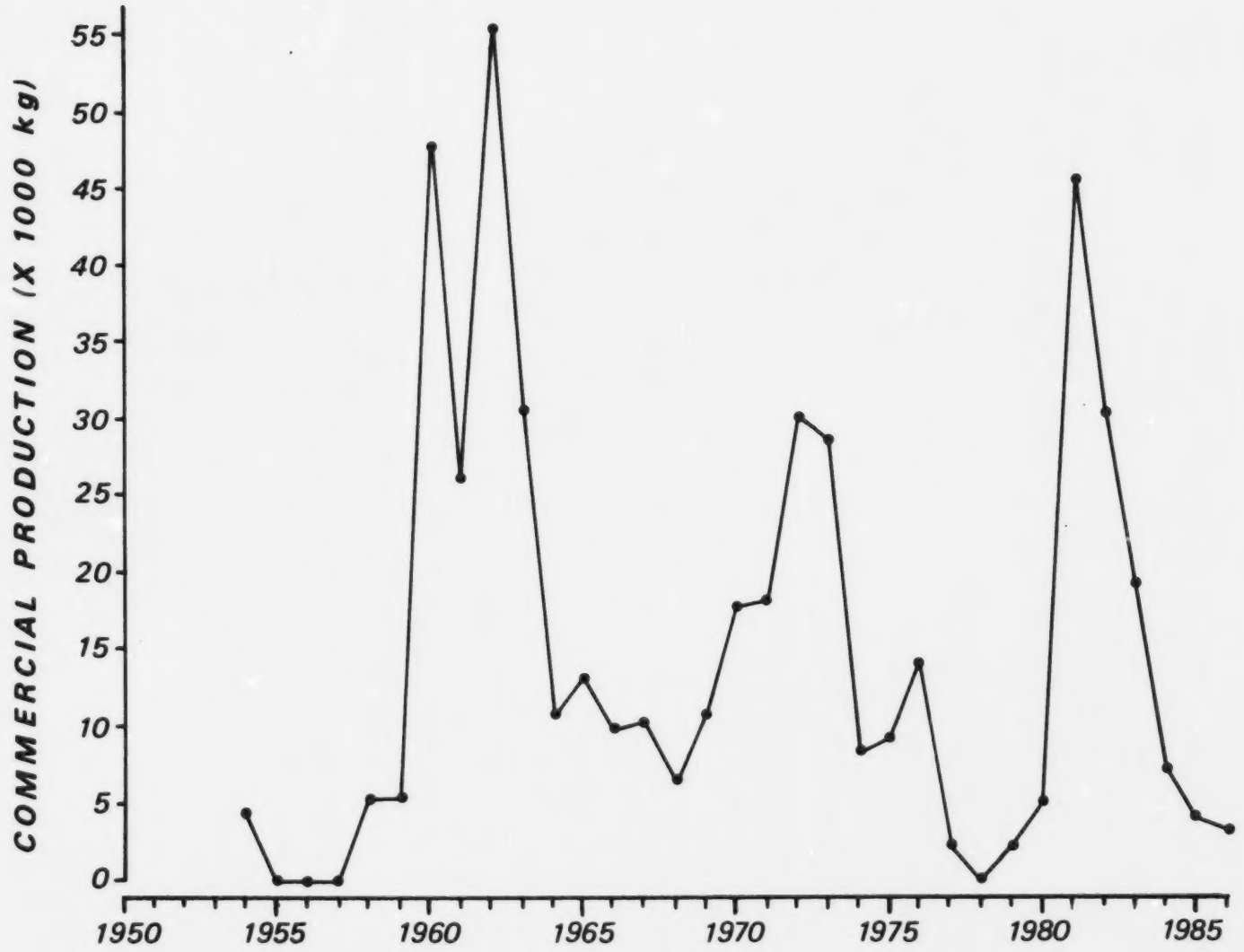

Fig. 3. Annual commercial production of walleye, Tathlina Lake, 1954-1986.

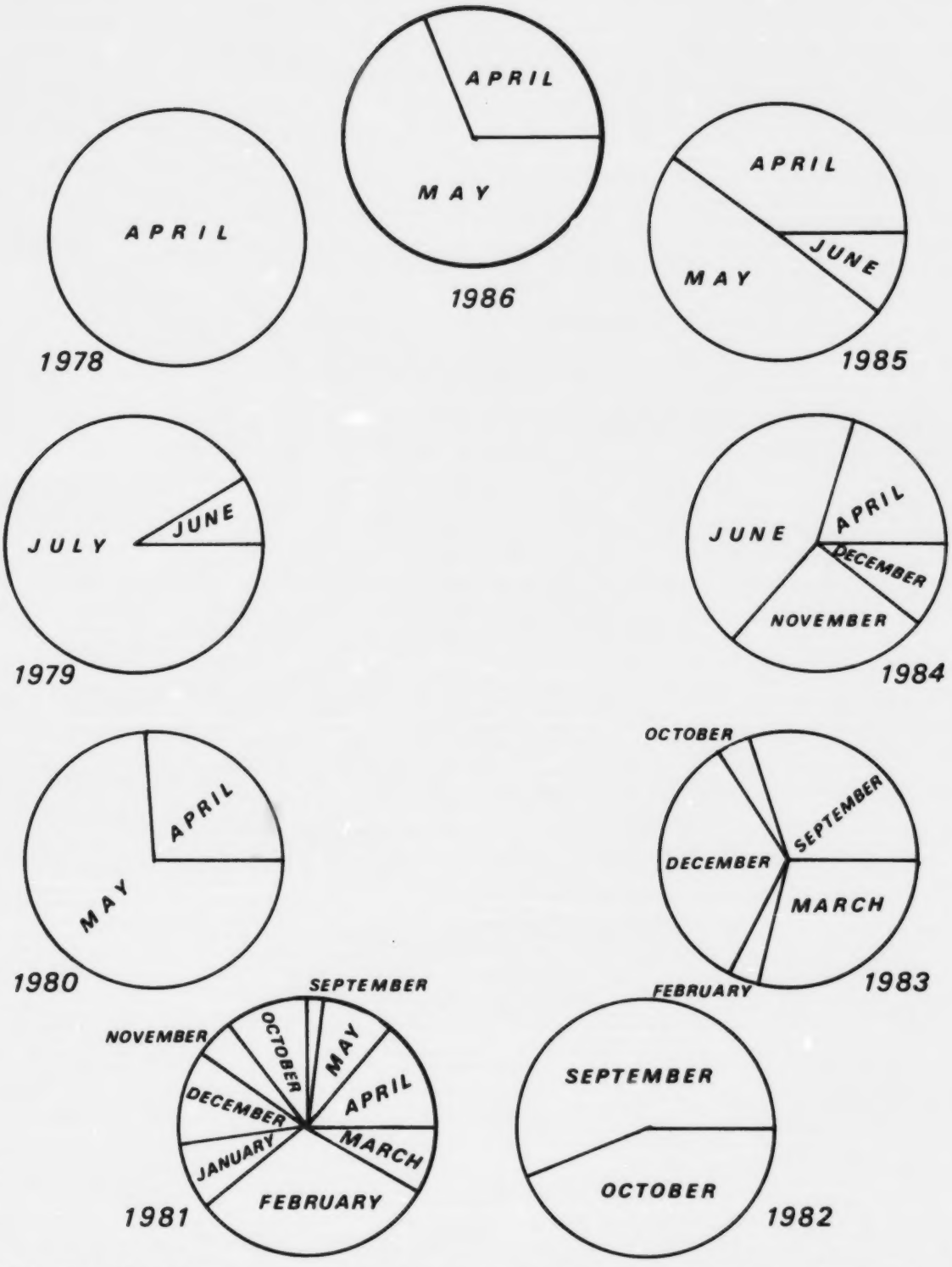

Fig. 4. Monthly percent occurrence of annual commercial harvest, Tathlina Lake, 1978-1986.

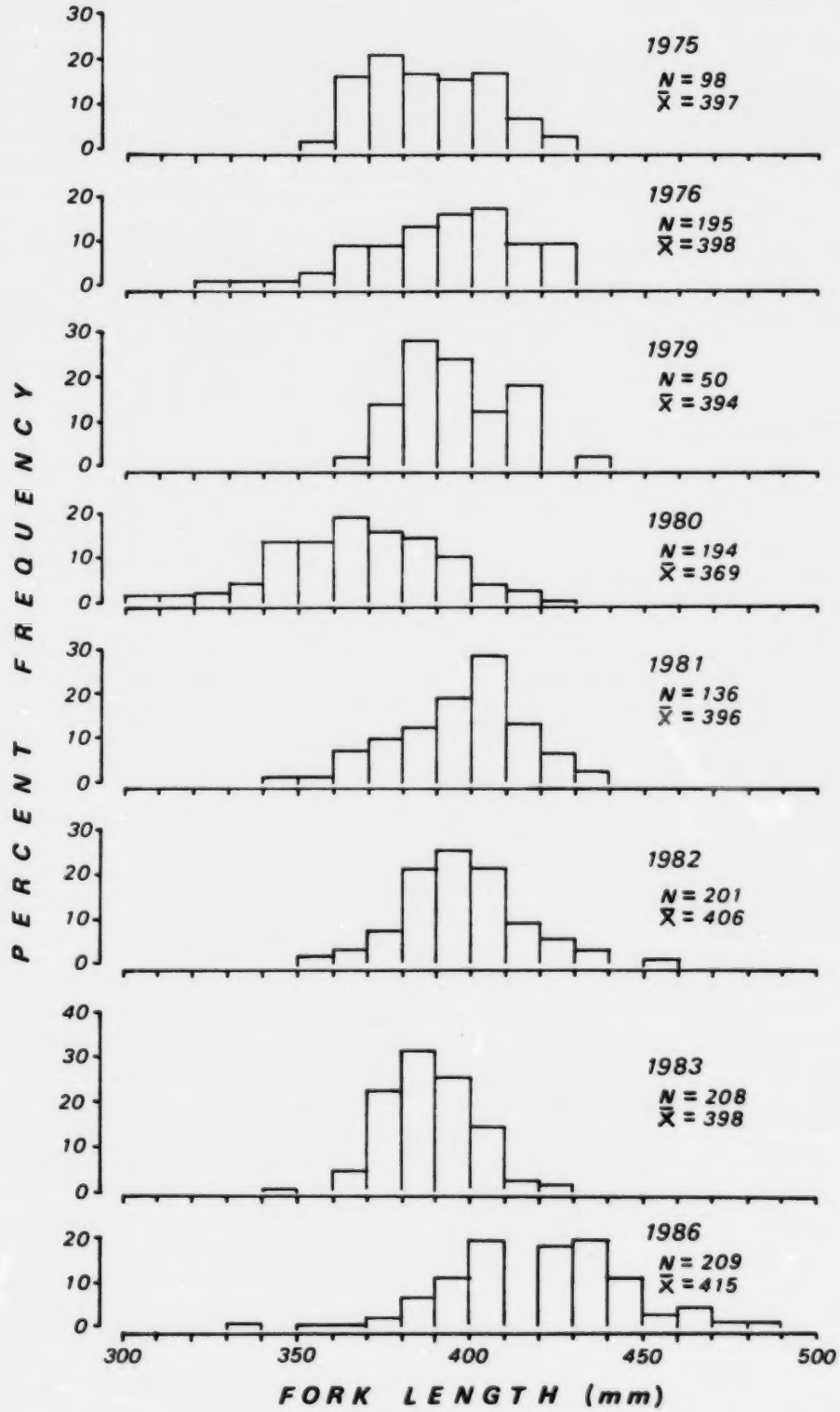

Fig. 5. Length frequency histograms for walleye caught in the commercial fishery, Tathlina Lake, 1975-1986.

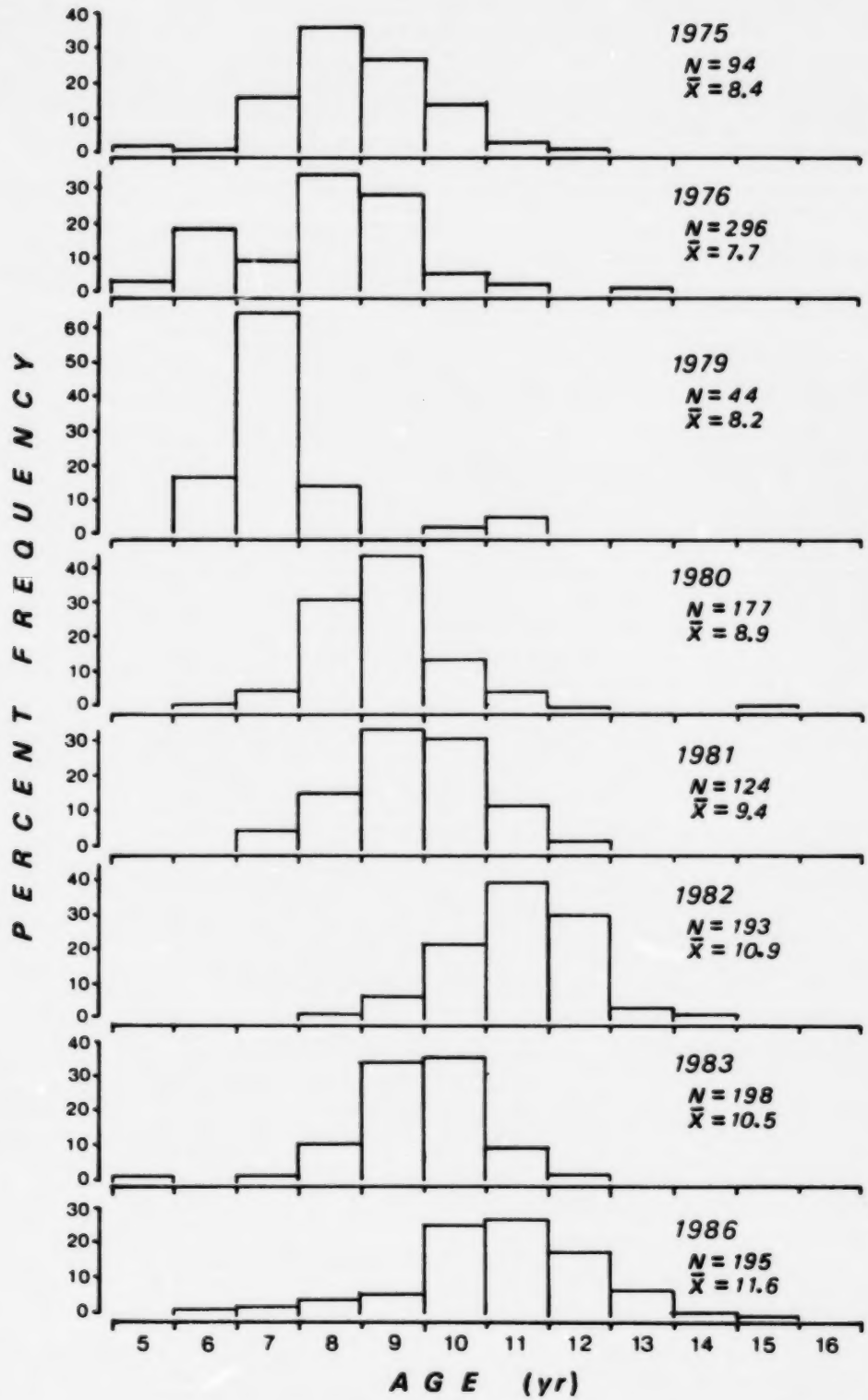

Fig. 6. Age frequency histograms for walleye caught in the commercial fishery, Tathlina Lake, 1975-1986.

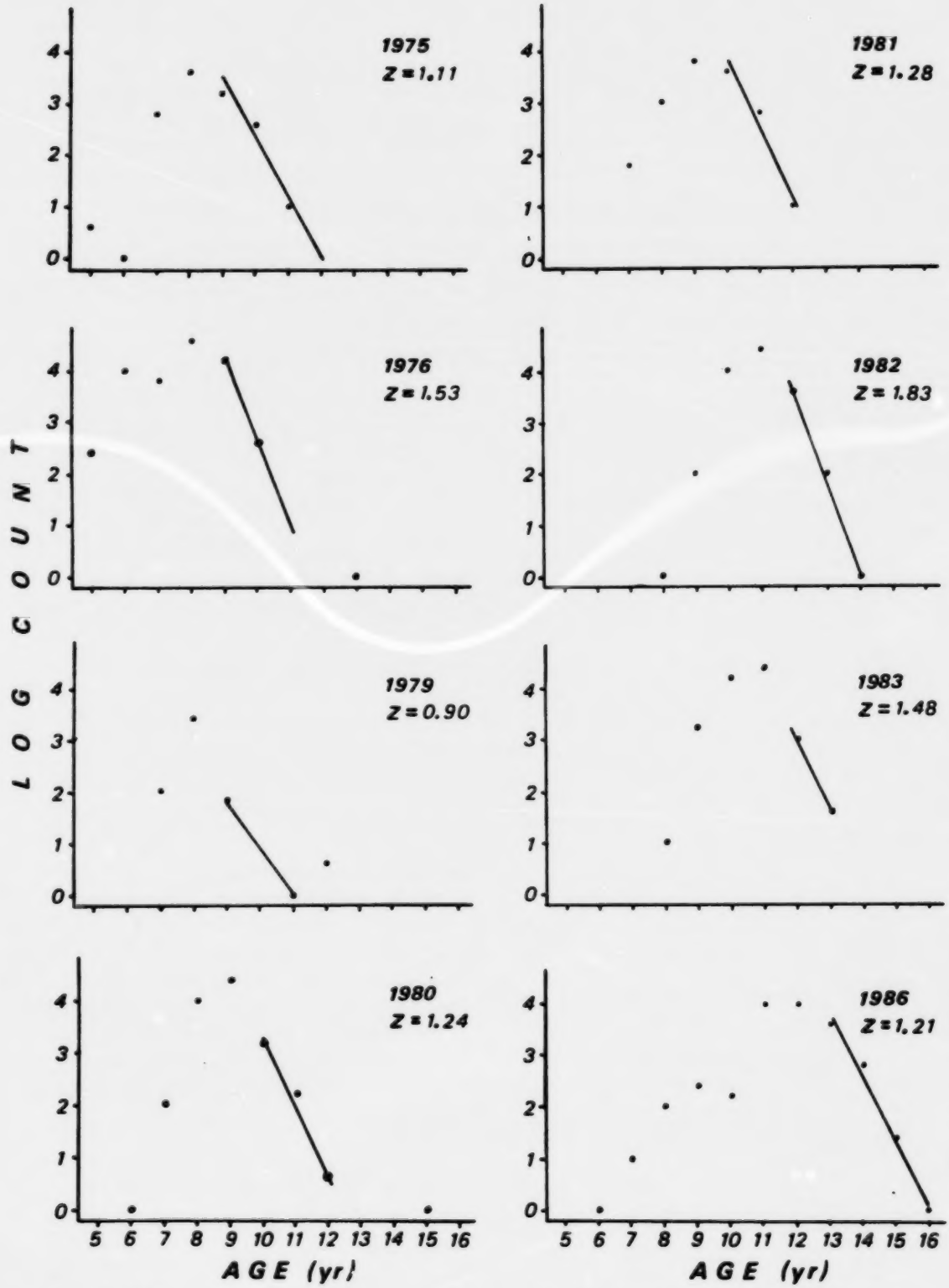

Fig. 7. Catch curves for walleye caught in the commercial fishery, Tathlina Lake, 1975-86.

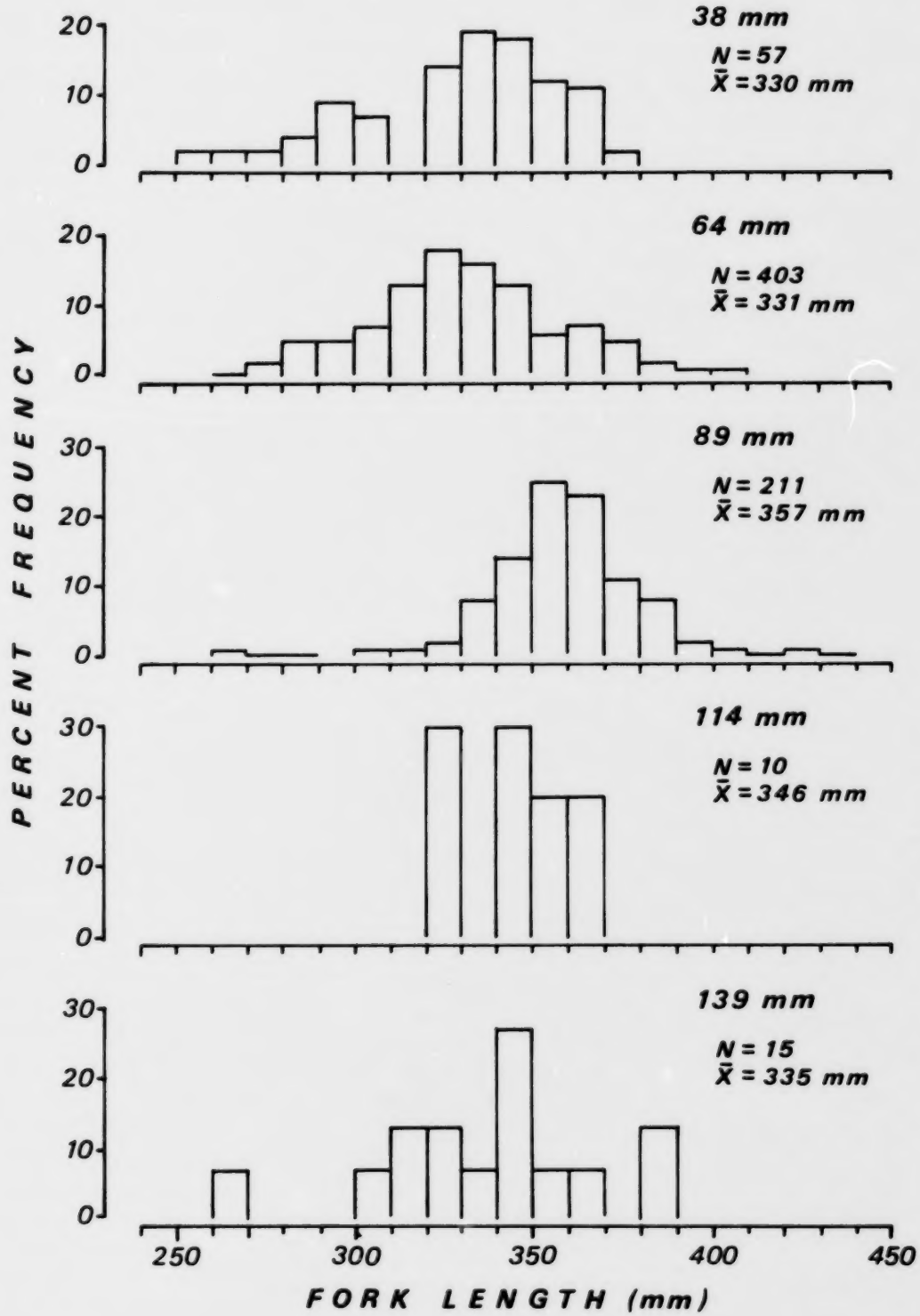

Fig. 8. Length frequency histograms for walleye caught in experimental gillnets, by mesh size, Tathlina Lake, 1979.

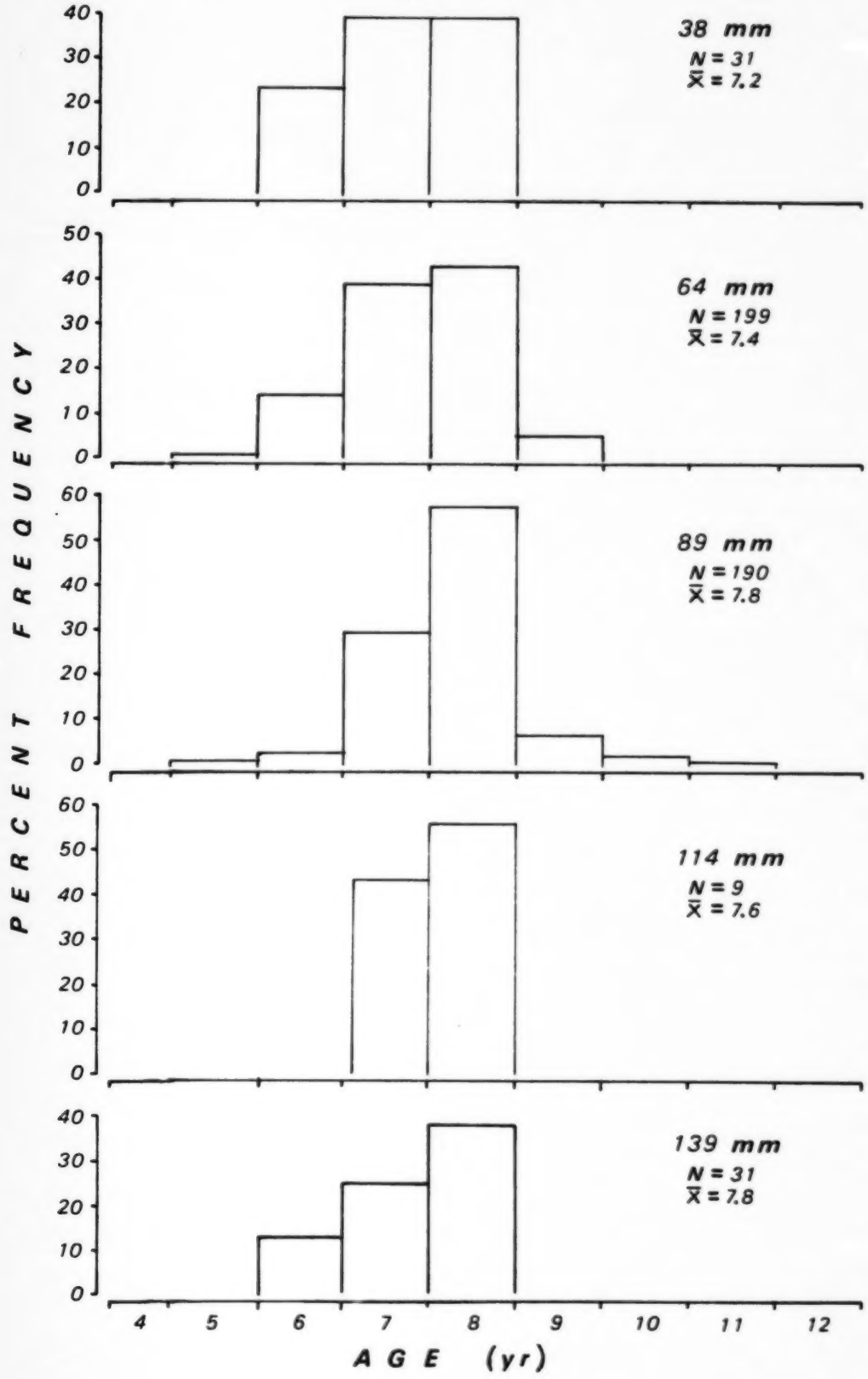

Fig. 9. Age frequency histograms for walleye caught in experimental gill nets, by mesh size, Tathlina Lake, 1979.

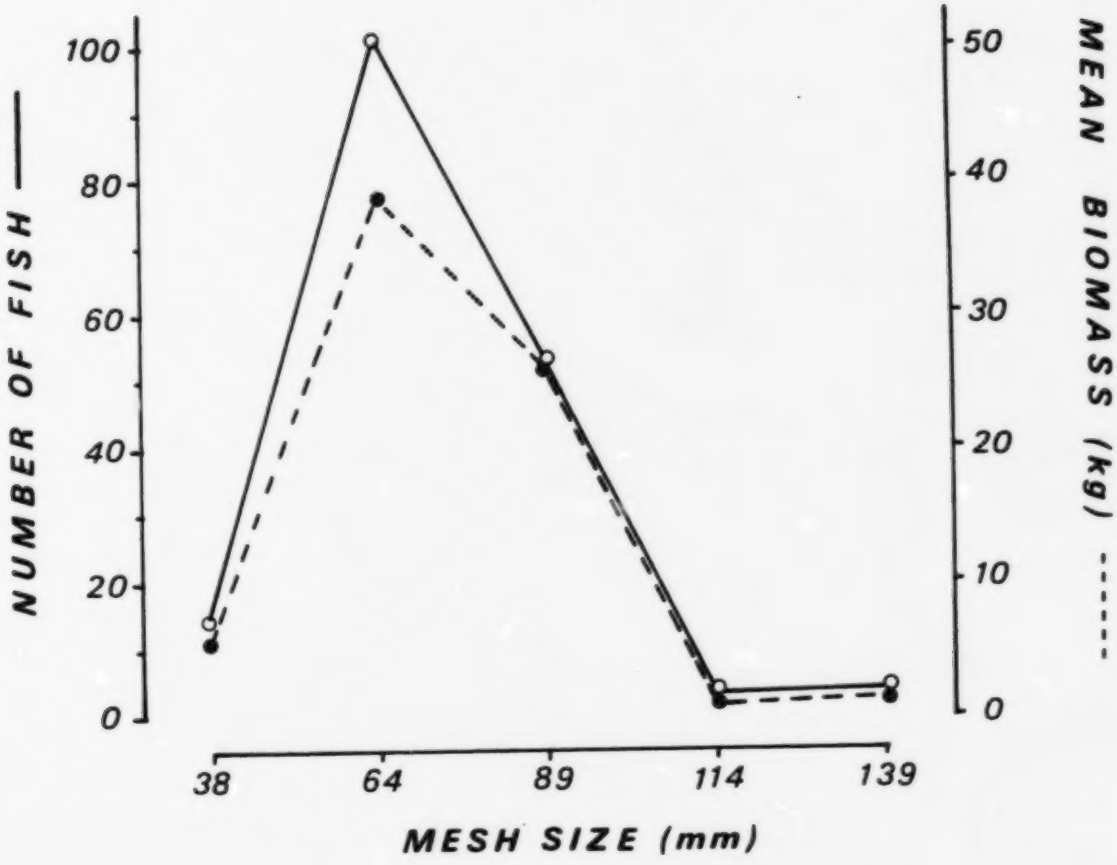

Fig. 10. Mean number and biomass of walleye caught in experimental gill nets, by mesh size, Tathlina Lake, 1979.

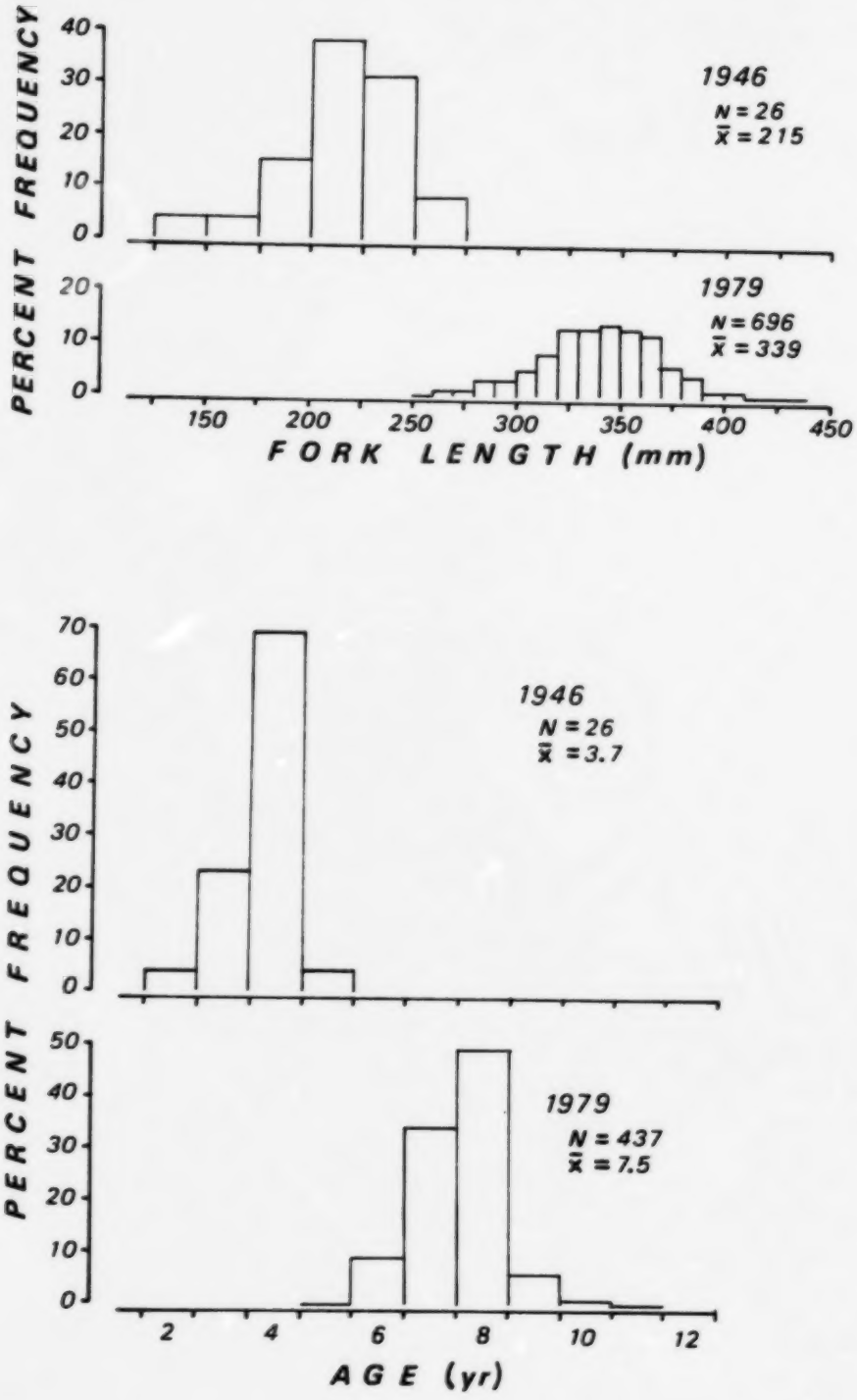

Fig. 11. Comparison of length and age frequency histograms for walleye, Tathlina Lake, 1946 and 1979.

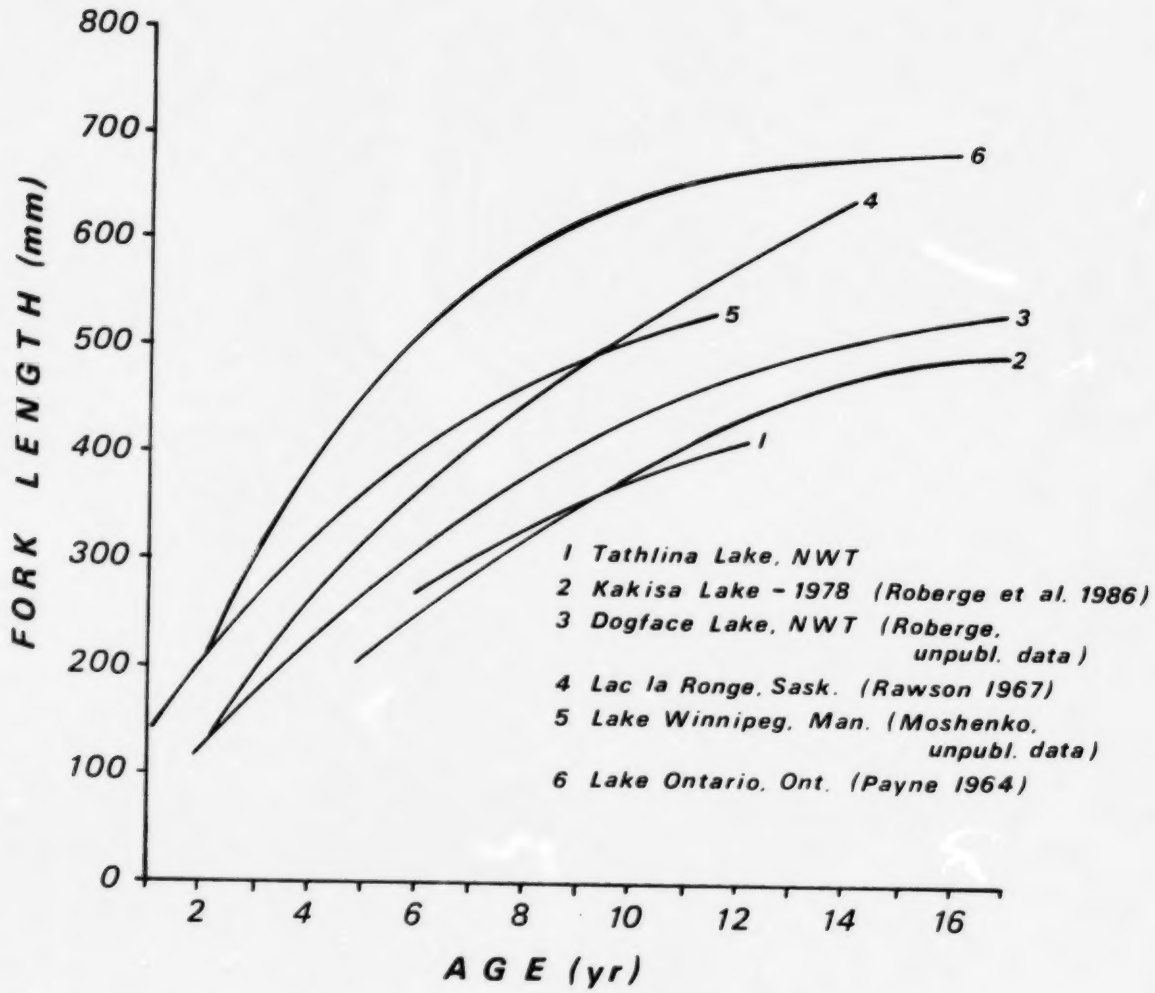

Fig. 12. Growth curves for walleye from Tathlina Lake, 1979 compared with other walleye populations.

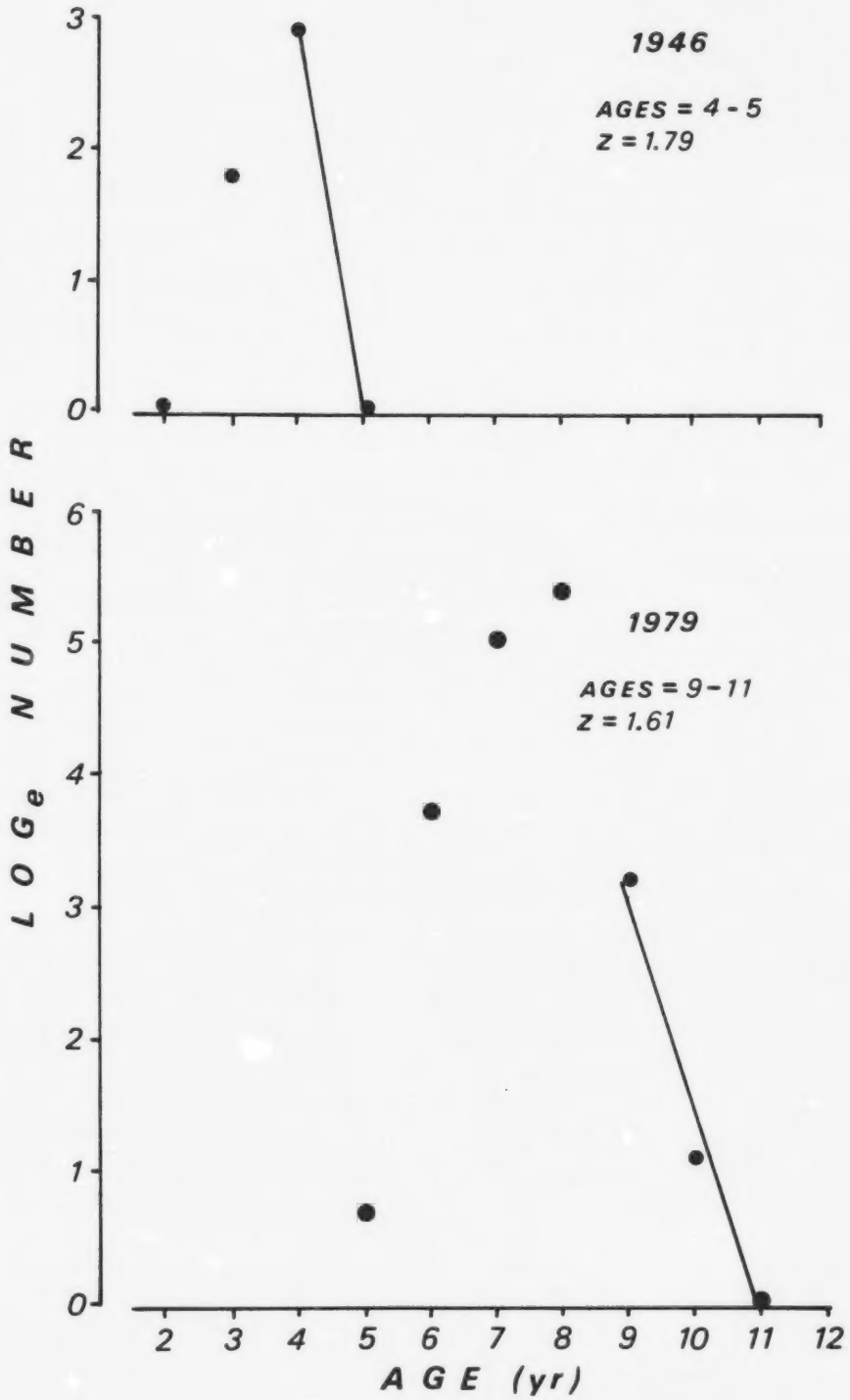

Fig. 13. Catch curves for walleye caught in experimental gillnets from Tathlina Lake, 1946 and 1979.

Appendix 1. A description of the experimental gill net gangs used in Tathlina Lake, 1979.

Mesh Size (mm)	Length (m)	Meshes Deep	Approx. Net Depth (m)	Twine Size
38	45.7	60	1.9	210/2
64	45.7	36	1.9	210/2
89	45.7	24	1.8	210/3
114	45.7	20	1.9	210/3
139	45.7	16	1.9	210/3

Appendix 2. A description of the relative stages of maturity used for northern fish.

1972-78[1]			1979 on[1]		
Sex		Maturity	Maturity		
F	M	Stage	Stage	Female	Male
1	6	Immature - virgin fish, gonad thin and threadlike, often incomplete	Immature	1 - ovaries granular in texture, up to full length in body cavity, hard and triangular in shape, firm membrane; eggs distinguishable	6 - testes puttylike firmness, tubular and scalloped in in shape, long and thin, and may be full length in body cavity
2	7	Maturing - virgin or non-virgin fish not spawning in current year, gonad full length, firm, egtgs of small size, gonads partially filling body cavity	Mature	2 - current year's spawner; ovaries fill body cavity; eggs nearing full size but not loose	7 - current year's spawner; testes large and lobate; white-purplish in colour; milt not expelled by pressure
3	8	Mature - fish spawning in current year, gonad full size filling body cavity, eggs prominent, full size	Ripe	3 - ovaries greatly extended, fill body cavity; eggs full size; eggs expelled by slight pressure	8 - testes full size; white and lobate; milt expelled by slight pressure
4	9	Ripe - mature fish in spawning condition, eggs translucent, milt or eggs expelled under slight pressure	Spent	4 - spawning complete; ovaries flaccid; seed eggs apparent; presence of residual mature eggs	9 - testes flaccid with some milt, blood vessels obvious with pink-violet coloration
5	10	Spent - mature fish completed spawning, gonads collapsed with ruptured blood vessels prominent	Resting	5 - non-virgin; not spawning in current year	10 - non-virgin; not spawning in current year

[1]Fish of unknown sex were coded as 0.

Appendix 3. Biological data by length interval for walleye caught in the commercial fishery, Tathlina Lake, 1975.

LENGTH INTERVAL (MM)	NO.	PERCENT	MEAN FORK LENGTH(MM)	ROUND WEIGHT(G) MEAN	ROUND WEIGHT(G) SD
360	9	9	366	678	36
370	19	19	376	740	47
380	13	13	384	781	43
390	16	16	393	835	55
400	14	14	405	897	54
410	13	13	414	984	90
420	9	9	424	1002	59
430	3	3	434	1092	104
440	2	2	445	1115	0
TOTAL	98				
MEAN			396	853	131

Appendix 4. Biological data by length interval for walleye caught in the commercial fishery, Tathlina Lake, 1976.

LENGTH INTERVAL (MM)	NO.	PERCENT	MEAN FORK LENGTH(MM)	ROUND WEIGHT(G) MEAN	ROUND WEIGHT(G) SD
320	1	1	327	450	-
330	1	1	331	450	-
340	2	1	347	475	35
350	6	3	354	533	41
360	17	9	366	571	35
370	18	9	375	622	35
380	26	13	385	667	42
390	32	16	394	722	47
400	33	17	405	762	43
410	18	9	414	786	41
420	18	9	423	836	59
430	14	7	433	861	53
440	4	2	445	913	75
450	3	2	452	967	29
460	1	1	466	1200	-
470	1	1	475	1250	-
TOTAL	195				
MEAN			398	727	123

Appendix 5. Biological data by length interval for walleye caught in the commercial fishery, Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	NO.	PERCENT	MEAN FORK LENGTH(MM)	ROUND WEIGHT(G) MEAN	ROUND WEIGHT(G) SD
350	1	2	354	436	-
360	4	8	367	504	33
370	7	14	376	504	32
380	11	22	383	555	34
390	13	26	394	571	28
400	4	8	406	637	7
410	8	16	417	640	35
420	1	2	422	667	-
430	1	2	439	735	-
TOTAL	50				
MEAN			392	572	64

Appendix 6. Biological data by length interval for walleye caught in the commercial fishery, Tathlina Lake, 1980.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
	N	LENGTH(MM) MEAN	WEIGHT(G) MEAN	SD	K	% MAT	N	LENGTH(MM) MEAN	WEIGHT(G) MEAN	SD	K	% MAT	N	LENGTH(MM) MEAN	WEIGHT(G) MEAN	SD	K	% MAT
300	1	305	300	-	1.06	100	-	-	-	-	-	-	1	305	300	-	1.06	100
310	1	318	350	-	1.09	100	-	-	-	-	-	-	1	318	350	-	1.09	100
320	3	323	383	29	1.13	100	-	-	-	-	-	-	3	323	383	29	1.13	100
330	8	334	419	26	1.13	100	-	-	-	-	-	-	8	334	419	26	1.13	100
340	25	344	454	29	1.11	100	1	347	450	-	1.08	100	26	344	454	28	1.11	100
350	19	354	513	28	1.15	100	6	354	508	49	1.15	100	25	354	512	33	1.15	100
360	25	364	532	38	1.11	100	11	363	568	51	1.18	100	36	364	543	45	1.13	100
370	13	373	585	38	1.12	100	18	374	603	32	1.15	100	31	374	595	35	1.14	100
380	10	384	660	52	1.16	100	19	383	679	25	1.21	100	29	384	672	37	1.19	100
390	6	393	658	38	1.08	100	14	393	696	37	1.15	100	20	393	685	40	1.13	100
400	3	403	700	50	1.07	100	3	403	767	29	1.17	100	7	404	729	49	1.11	86
410	1	410	800	-	1.16	100	4	415	825	29	1.16	100	5	414	820	27	1.16	100
420	-	-	-	-	-	-	1	420	850	-	1.15	100	1	420	850	-	1.15	100
480	-	-	-	-	-	-	1	487	1150	-	1.00	100	1	487	1150	-	1.00	100
TOTAL	115						78						194					
MEAN		360	527	93	1.12			381	652	106	1.17			369	578	116	1.14	

Appendix 7. Biological data by length interval for walleye caught in the commercial fishery, Tathlina Lake, 1981.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
	N	LENGTH(MM) MEAN	WEIGHT(G) MEAN	SD	K	% MAT	N	LENGTH(MM) MEAN	WEIGHT(G) MEAN	SD	K	% MAT	N	LENGTH(MM) MEAN	WEIGHT(G) MEAN	SD	K	% MAT
340	1	347	450	-	1.08	100	-	-	-	-	-	-	1	347	450	-	1.08	100
350	1	352	500	-	1.15	100	-	-	-	-	-	-	2	355	525	35	1.18	50
360	7	365	586	24	1.20	100	2	366	575	106	1.17	100	9	365	583	43	1.20	100
370	10	375	625	35	1.19	100	3	376	667	29	1.25	100	13	375	635	38	1.20	100
380	4	384	663	48	1.17	100	12	384	704	40	1.25	100	16	384	694	44	1.23	100
390	6	394	700	32	1.15	100	20	395	765	52	1.25	100	26	394	750	55	1.22	100
400	8	403	769	37	1.17	100	30	403	788	45	1.21	100	38	403	784	44	1.20	100
410	1	418	800	-	1.10	100	17	414	850	43	1.20	100	18	414	847	44	1.19	100
420	1	420	850	-	1.15	100	8	421	913	35	1.22	100	9	421	906	39	1.21	100
430	-	-	-	-	-	-	4	433	900	41	1.11	100	4	433	900	41	1.11	100
TOTAL	39						96						136					
MEAN		384	665	91	1.17			402	791	83	1.22			396	753	103	1.20	

Appendix 8. Biological data by length interval for walleye caught in the commercial fishery, Tathlina Lake, 1982.

LENGTH INTERVAL (MM)	NO.	PERCENT	MEAN FORK LENGTH(MM)	ROUND WEIGHT(G) MEAN	SD
370	6	3	372	633	41
380	12	6	385	713	32
390	32	15	394	753	44
400	51	24	404	819	54
410	49	23	413	879	55
420	37	17	423	922	60
430	15	7	433	993	50
440	11	5	443	1041	58
450	1	0	455	1150	-
460	1	0	462	1200	-
TOTAL	215				
MEAN			411	856	109

Appendix 9. Biological data by length interval for walleye caught in the commercial fishery, Tathlina Lake, 1983.

LENGTH INTERVAL (MM)	NO.	PERCENT	MEAN FORK LENGTH(MM)	ROUND WEIGHT(G) MEAN	SD
330	1	0	338	504	-
360	1	0	369	640	-
370	18	9	376	738	53
380	43	21	386	765	64
390	63	30	395	799	52
400	46	22	405	855	66
410	25	12	414	901	54
420	7	3	423	921	47
430	2	1	431	1047	0
440	2	1	446	1115	96
TOTAL	208				
MEAN			397	819	90

Appendix 10. Biological data by length interval for walleye caught in the commercial fishery, Tathlina Lake, 1986.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
330	2	336	450	0	1.19	100	-	-	-	-	-	-	2	336	450	0	1.19	100
350	1	355	500	-	1.12	100	-	-	-	-	-	-	1	355	500	-	1.12	100
360	1	368	550	-	1.10	100	-	-	-	-	-	-	1	368	550	-	1.10	100
370	2	372	575	35	1.12	100	2	374	700	71	1.34	100	4	373	638	85	1.23	100
380	13	384	688	46	1.22	100	1	387	750	-	1.29	100	14	384	693	47	1.22	100
390	15	395	720	32	1.17	100	9	398	728	36	1.16	100	24	396	723	33	1.16	100
400	34	404	771	39	1.17	100	6	407	800	32	1.19	100	40	404	775	39	1.17	100
410	27	414	809	48	1.14	100	11	412	868	56	1.24	100	38	413	826	57	1.17	100
420	22	423	852	55	1.12	100	18	423	872	39	1.15	100	40	423	861	49	1.14	100
430	8	432	888	52	1.10	100	14	434	946	77	1.16	100	22	433	925	74	1.14	100
440	-	-	-	-	-	-	7	441	986	69	1.15	100	7	441	986	69	1.15	100
450	-	-	-	-	-	-	9	454	1028	62	1.10	100	9	454	1028	62	1.10	100
460	-	-	-	-	-	-	3	467	1083	76	1.06	100	3	467	1083	76	1.06	100
470	-	-	-	-	-	-	2	471	1150	0	1.10	100	2	471	1150	0	1.10	100
510	-	-	-	-	-	-	2	510	1575	35	1.19	100	2	510	1575	35	1.19	100
TOTAL	125						84						209					
MEAN		406	774	92	1.15			427	915	156	1.17			415	831	140	1.16	

Appendix 11. Biological data by age group for walleye caught in the commercial fishery, Tathlina Lake, 1975.

AGE (YR)	NO.	PERCENT	FORK LENGTH(MM) MEAN	FORK LENGTH(MM) SD	ROUND WEIGHT(G) MEAN	ROUND WEIGHT(G) SD
5	2	2	369	4.8	708	96
6	1	1	376	-	708	-
7	15	16	385	19.6	780	110
8	34	36	394	18.5	834	107
9	25	27	400	22.2	871	150
10	13	14	406	20.1	943	126
11	3	3	412	7.3	1002	78
12	1	1	394	-	911	-
TOTAL	94					
MEAN			396	20.7	852	133
MEAN AGE	8.4					

Appendix 12. Biological data by age group for walleye caught in the commercial fishery, Tathlina Lake, 1976.

AGE (YR)	NO.	PERCENT	FORK LENGTH(MM) MEAN	FORK LENGTH(MM) SD	ROUND WEIGHT(G) MEAN	ROUND WEIGHT(G) SD
4	4	2	342	16.8	488	48
5	34	17	375	17.8	626	92
6	40	21	395	19.6	706	95
7	62	32	405	19.0	753	92
8	40	21	408	21.7	775	101
9	12	6	422	30.1	854	203
10	3	2	404	15.6	800	87
TOTAL	195					
MEAN			398	25.1	727	123
MEAN AGE	6.8					

Appendix 13. Biological data by age group for walleye caught in the commercial fishery, Tathlina Lake, 1979.

AGE (YR)	NO.	PERCENT	FORK LENGTH(MM) MEAN	FORK LENGTH(MM) SD	ROUND WEIGHT(G) MEAN	ROUND WEIGHT(G) SD
7	7	16	386	18.5	545	83
8	28	64	388	13.0	560	48
9	6	14	406	13.9	613	42
11	1	2	410	-	640	-
12	2	5	416	2.7	626	38
TOTAL	44					
MEAN			392	16.1	570	58
MEAN AGE	8.2					

Appendix 14. Biological data by age group for walleye caught in the commercial fishery, Tathlina Lake, 1980.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
6	1	322	-	350	-	1.05	100	-	-	-	-	-	-	-	1	322	-	350	-	1.05	100
7	8	343	17.8	444	62	1.10	100	-	-	-	-	-	-	-	8	343	17.8	444	62	1.10	100
8	40	352	12.6	493	64	1.13	100	15	371	12.3	593	68	1.16	100	55	357	15.1	520	79	1.13	100
9	40	365	16.2	551	73	1.13	100	37	377	15.4	630	91	1.17	100	77	370	16.9	589	91	1.15	100
10	8	369	16.8	556	73	1.10	100	15	392	13.7	703	72	1.17	100	24	385	18.3	654	99	1.14	100
11	6	398	9.2	708	58	1.13	100	3	403	10.1	750	100	1.14	100	9	400	9.2	722	71	1.13	100
12	-	-	-	-	-	-	-	2	381	22.6	650	71	1.18	100	2	381	22.6	650	71	1.18	100
15	-	-	-	-	-	-	-	1	487	-	1150	-	1.00	100	1	487	-	1150	-	1.00	100
TOTAL	103							73							177						
MEAN		360	19	528	89	1.12			381	20.6	650	108	1.16			369	22.5	579	115	1.14	
MEAN AGE	8.9																				

Appendix 15. Biological data by age group for walleye caught in the commercial fishery, Tathlina Lake, 1981.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
7	5	370	5.5	600	35	1.19	100	-	-	-	-	-	-	-	6	368	7.1	592	38	1.19	100
8	11	378	17.1	636	84	1.18	100	8	385	13.9	681	88	1.19	100	19	381	15.9	655	86	1.18	100
9	11	381	15.4	650	87	1.17	100	31	403	13.2	795	80	1.22	100	42	397	16.8	757	103	1.20	100
10	8	394	12.9	713	79	1.16	100	31	405	13.0	810	79	1.22	100	39	403	13.5	790	87	1.20	100
11	1	420	-	850	-	1.15	100	14	401	9.1	789	49	1.23	100	15	402	10.1	793	50	1.22	100
12	1	418	-	800	-	1.10	100	2	417	0.7	875	35	1.21	100	3	417	1.0	850	50	1.17	100
TOTAL	37							86							124						
MEAN		383	18	662	91	1.17			402	13.6	791	83	1.22			396	17.5	750	105	1.20	
MEAN AGE	9.4																				

Appendix 16. Biological data by age group for walleye caught in the commercial fishery, Tathlina Lake, 1982.

AGE (YR)	NO.	PERCENT	FORK LENGTH(MM) MEAN	FORK LENGTH(MM) SD	ROUND WEIGHT(G) MEAN	ROUND WEIGHT(G) SD
8	1	0	392	-	750	-
9	8	4	387	22.2	725	125
10	57	28	405	11.9	813	84
11	90	44	411	16.1	857	104
12	39	19	422	14.4	924	99
13	8	4	422	15.0	975	104
14	1	0	442	-	1100	-
TOTAL	204					
MEAN			411	16.9	858	112
MEAN AGE	10.9					

Appendix 17. Biological data by age group for walleye caught in the commercial fishery, Tathlina Lake, 1983.

AGE (YR)	NO.	PERCENT	FORK LENGTH(MM) MEAN	FORK LENGTH(MM) SD	ROUND WEIGHT(G) MEAN	ROUND WEIGHT(G) SD
5	1	1	338	-	504	-
8	3	2	393	10.0	821	141
9	23	12	395	12.2	790	61
10	70	35	394	12.7	794	81
11	74	37	400	14.3	844	86
12	22	11	405	13.5	865	90
13	5	3	391	6.8	789	30
TOTAL	198					
MEAN			397	14.2	819	89
MEAN AGE	10.5					

Appendix 18. Biological data by age group for walleye caught in the commercial fishery, Tathlina Lake, 1986.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
6	1	333	-	450	-	1.22	100	-	-	-	-	-	-	-	1	333	-	450	-	1.22	100
7	2	353	21	500	71	1.13	100	1	420	-	850	-	1.15	100	3	375	41	617	208	1.14	100
8	5	375	16	610	96	1.15	100	3	403	9	767	115	1.16	100	8	386	19	669	125	1.15	100
9	2	392	9	700	0	1.17	100	9	405	11	806	63	1.21	100	11	402	12	786	71	1.21	100
10	7	401	11	750	58	1.17	100	2	397	3	725	35	1.16	100	9	400	10	744	53	1.17	100
11	26	406	13	773	71	1.15	100	25	418	20	862	108	1.18	100	51	412	18	817	101	1.16	100
12	33	408	12	776	60	1.14	100	22	432	18	934	96	1.16	100	55	417	19	839	109	1.15	100
13	25	416	12	834	64	1.16	100	11	438	14	950	89	1.14	100	36	423	16	869	90	1.15	100
14	12	415	14	817	89	1.14	100	4	448	11	1025	65	1.14	100	16	423	19	869	124	1.14	100
15	1	408	-	850	-	1.25	100	3	474	35	1250	312	1.16	100	4	458	44	1150	324	1.18	100
16	1	430	-	850	-	1.07	100	-	-	-	-	-	-	-	1	430	-	850	-	1.07	100
TOTAL	115							80							195						
MEAN		406	18	776	94	1.15			426	23	903	139	1.17			414	22	828	131	1.16	
MEAN AGE	11.4							11.4							11.6						

Appendix 19. Biological data by length interval for walleye caught by experimental gill nets (39 mm mesh), Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES N	MALES LENGTH(MM) MEAN	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
250	-	-	-	-	-	-	1	254	180	-	1.10	0	1	254	180	-	1.10	0
260	-	-	-	-	-	-	1	267	220	-	1.16	100	1	267	220	-	1.16	100
270	-	-	-	-	-	-	-	-	-	-	-	-	1	272	220	-	1.09	0
280	1	280	220	-	1.00	0	1	289	260	-	1.08	0	2	285	240	28	1.04	0
290	-	-	-	-	-	-	4	294	275	10	1.08	75	5	294	272	11	1.07	60
300	2	306	280	0	0.98	100	1	302	320	-	1.16	100	4	305	300	23	1.06	75
320	5	325	348	18	1.02	100	3	322	353	12	1.06	100	8	324	350	15	1.03	100
330	3	332	407	12	1.12	100	8	335	415	26	1.10	100	11	334	413	22	1.11	100
340	2	344	400	0	0.98	100	8	345	440	32	1.07	100	10	345	432	33	1.05	100
350	2	354	470	14	1.06	100	5	354	476	26	1.07	100	7	354	474	22	1.07	100
360	1	360	500	-	1.07	100	5	362	512	11	1.08	100	6	362	510	11	1.08	100
370	1	377	560	-	1.05	100	-	-	-	-	-	-	1	377	560	-	1.05	100
TOTAL	17						37						57					
MEAN		332	385	86	1.04			332	403	91	1.08			330	391	92	1.07	

Appendix 20. Biological data by length interval for walleye caught by experimental gill nets (64 mm mesh), Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
260	-	-	-	-	-	-	-	-	-	-	-	-	1	268	220	-	1.14	0
270	6	277	220	25	1.04	0	-	-	-	-	-	-	8	277	218	23	1.03	0
280	7	284	249	23	1.09	29	10	284	244	18	1.07	60	19	284	245	19	1.07	42
290	7	293	266	22	1.05	57	10	294	266	16	1.05	80	19	294	271	28	1.07	63
300	11	305	293	16	1.04	82	14	305	291	19	1.03	79	28	305	290	18	1.03	71
310	35	314	316	14	1.02	86	16	315	329	24	1.05	94	52	315	320	19	1.03	87
320	48	324	346	22	1.01	94	25	324	366	21	1.08	92	73	324	353	23	1.04	93
330	29	334	381	23	1.02	97	34	334	394	26	1.06	100	64	334	388	26	1.04	97
340	16	344	414	19	1.02	100	36	344	443	27	1.09	100	52	344	434	28	1.07	100
350	9	354	456	28	1.03	100	16	353	463	39	1.05	100	25	353	460	35	1.04	100
360	8	365	488	30	1.01	100	19	364	516	22	1.07	100	27	364	507	27	1.05	100
370	5	374	512	23	0.98	100	15	373	541	23	1.04	100	20	374	534	26	1.02	100
380	1	380	560	-	1.02	100	6	383	587	27	1.05	100	7	382	583	27	1.04	100
390	-	-	-	-	-	-	5	392	576	22	0.95	100	5	392	576	22	0.95	100
400	-	-	-	-	-	-	3	403	620	53	0.95	100	3	403	620	53	0.95	100
TOTAL	182						209						403					
MEAN		325	355	70	1.02			338	414	98	1.06			331	383	92	1.04	

Appendix 21. Biological data by length interval for walleye caught by experimental gill nets (89 mm mesh), Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED				
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)		%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
260	1	266	200	-	1.06	0	1	262	200	-	1.11	0	2	264	200	0	1.09	0
270	-	-	-	-	-	-	1	275	200	-	0.96	0	1	275	200	-	0.96	0
280	-	-	-	-	-	-	-	-	-	-	-	-	1	287	260	-	1.10	0
300	1	302	300	-	1.09	0	1	302	300	-	1.09	0	2	302	300	0	1.09	0
310	1	310	280	-	0.94	100	2	317	340	28	1.07	100	3	314	320	40	1.03	100
320	2	326	390	14	1.13	100	2	326	390	42	1.13	100	4	326	390	26	1.13	100
330	4	334	415	53	1.12	100	13	334	425	26	1.14	100	17	334	422	32	1.14	100
340	8	345	461	39	1.13	100	22	345	465	24	1.14	100	30	345	464	28	1.13	100
350	7	355	483	35	1.08	100	45	354	490	29	1.10	100	53	354	489	30	1.10	98
360	15	364	513	33	1.07	100	33	364	527	29	1.09	100	48	364	523	30	1.08	100
370	5	374	556	46	1.06	100	17	373	557	36	1.07	100	23	374	555	37	1.06	96
380	5	384	572	23	1.01	100	12	384	597	25	1.05	100	17	384	589	27	1.04	100
390	2	393	560	57	0.93	100	2	397	650	14	1.04	100	4	395	605	62	0.99	100
400	-	-	-	-	-	-	2	406	655	35	0.98	100	2	406	655	35	0.98	100
410	1	415	740	-	1.04	100	-	-	-	-	-	-	1	415	740	-	1.04	100
420	1	426	820	-	1.06	100	1	420	740	-	1.00	100	2	423	780	57	1.03	100
430	-	-	-	-	-	-	1	439	660	-	0.78	100	1	439	660	-	0.78	100
TOTAL	53						155						211					
MEAN		358	496	99	1.07			358	503	76	1.10			357	500	83	1.09	

Appendix 22. Biological data by length interval for walleye caught by experimental gill nets (114 mm mesh), Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
320	-	-	-	-	-	-	3	327	387	12	1.10	100	3	327	387	12	1.10	100
340	2	345	430	42	1.05	100	1	347	480	-	1.15	100	3	346	447	42	1.08	100
350	1	357	440	-	0.97	100	1	355	480	-	1.07	100	2	356	460	28	1.02	100
360	-	-	-	-	-	-	2	366	530	42	1.08	100	2	366	530	42	1.08	100
TOTAL	3						7						10					
MEAN		349	433	31	1.02			345	454	69	1.10			346	448	59	1.07	

Appendix 23. Biological data by length interval for walleye caught by experimental gill nets (139 mm mesh), Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
260	-	-	-	-	-	-	1	268	200	-	1.04	0	1	268	200	-	1.04	0
300	1	300	300	-	1.11	100	-	-	-	-	-	-	1	300	300	-	1.11	100
310	1	310	300	-	1.01	100	-	-	-	-	-	-	2	311	310	14	1.03	50
320	-	-	-	-	-	-	2	326	390	14	1.13	100	2	326	390	14	1.13	100
330	-	-	-	-	-	-	1	330	440	-	1.22	100	1	330	440	-	1.22	100
340	-	-	-	-	-	-	4	343	440	16	1.09	100	4	343	440	16	1.09	100
350	-	-	-	-	-	-	1	353	480	-	1.09	100	1	353	480	-	1.09	100
360	-	-	-	-	-	-	1	363	500	-	1.05	100	1	363	500	-	1.05	100
380	1	386	600	-	1.04	100	1	380	640	-	1.17	100	2	383	620	28	1.10	100
TOTAL	3						11						15					
MEAN		332	400	173	1.05			338	436	104	1.11			335	421	114	1.09	

Appendix 24. Biological data by age group for walleye caught by experimental gill nets (39 mm mesh), Tathlina Lake, 1979.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
6	3	305	25.0	307	103	1.05	67	4	278	21.7	245	60	1.12	75	7	290	25.6	271	80	1.09	71
7	2	335	14.1	360	57	0.95	100	10	342	14.8	422	60	1.05	100	12	341	14.3	412	62	1.03	100
8	5	345	22.2	444	83	1.07	100	7	351	10.6	469	45	1.08	100	12	349	15.7	458	61	1.08	100
TOTAL	10							21							31						
MEAN		331	27	386	99	1.04			333	30.9	404	97	1.07			332	29.2	398	97	1.06	
MEAN AGE	7.2																				

Appendix 25. Biological data by age group for walleye caught by experimental gill nets (64 mm mesh), Tathlina Lake, 1979.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
5	1	278	-	240	-	1.12	0	-	-	-	-	-	-	-	1	278	-	240	-	1.12	0
6	14	298	19.6	281	49	1.06	50	11	300	24.7	296	83	1.08	55	27	297	21.8	283	65	1.07	48
7	36	323	18.4	347	68	1.02	83	35	331	29.3	383	100	1.04	97	77	325	24.3	361	86	1.03	83
8	32	337	18.0	392	62	1.02	97	53	351	19.9	462	74	1.06	98	85	346	20.3	436	77	1.05	98
9	3	360	17.8	473	46	1.01	100	6	374	16.5	557	29	1.07	100	9	370	17.3	529	53	1.05	100
TOTAL	86							105							199						
MEAN		325	24	356	76	1.03			340	29.6	424	104	1.06			332	28.7	389	99	1.05	
MEAN AGE	7.4																				

Appendix 26. Biological data by age group for walleye caught by experimental gill nets (89 mm mesh), Tathlina Lake, 1979.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	287	-	260	-	1.10	0
6	3	301	35.0	287	81	1.03	33	3	296	48.6	300	173	1.07	33	6	299	38.0	293	121	1.05	33
7	14	351	18.4	472	72	1.09	100	41	349	17.8	476	72	1.11	98	55	349	17.8	475	71	1.11	98
8	19	360	19.2	502	66	1.07	100	89	360	15.2	514	59	1.10	100	110	360	15.8	512	60	1.10	98
9	4	373	7.6	545	30	1.05	100	10	377	15.8	550	78	1.02	100	14	376	13.8	549	66	1.03	100
10	2	390	35.4	630	156	1.05	100	1	388	-	600	-	1.03	100	3	389	25.0	620	111	1.04	100
11	-	-	-	-	-	-	-	1	439	-	660	-	0.78	100	1	439	-	660	-	0.78	100
TOTAL	42							145							190						
MEAN		355	26	487	95	1.07			357	21.5	503	77	1.10			357	23.0	498	83	1.09	
MEAN AGE		7.8																			

Appendix 27. Biological data by age group for walleye caught by experimental gill nets (114 mm mesh), Tathlina Lake, 1979.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
7	1	348	-	460	-	1.09	100	3	348	19.0	473	90	1.12	100	4	348	15.5	470	74	1.11	100
8	2	350	10.6	420	28	0.98	100	3	336	16.5	420	53	1.10	100	5	341	14.8	420	40	1.06	100
TOTAL	3							6							9						
MEAN		349	7.5	433	31	1.02			342	17.2	447	72	1.11			344	14.5	442	60	1.08	
MEAN AGE		7.6																			

Appendix 28. Biological data by age group for walleye caught by experimental gill nets (139 mm mesh), Tathlina Lake, 1979.

AGE (YR)	MALES							FEMALES							COMBINED						
	N	LENGTH(MM) MEAN	SD	WEIGHT(G) MEAN	SD	K	% MAT	N	LENGTH(MM) MEAN	SD	WEIGHT(G) MEAN	SD	K	% MAT	N	LENGTH(MM) MEAN	SD	WEIGHT(G) MEAN	SD	K	% MAT
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	312	-	320	-	1.05	0
7	1	300	-	300	-	1.11	100	1	342	-	440	-	1.10	100	2	321	29.7	370	99	1.11	100
8	-	-	-	-	-	-	-	3	336	8.1	420	20	1.10	100	3	336	8.1	420	20	1.10	100
9	1	386	-	600	-	1.04	100	1	380	-	640	-	1.17	100	2	383	4.2	620	28	1.10	100
TOTAL	2							5							8						
MEAN		343	61	450	212	1.08			346	19.9	468	98	1.12			341	29.9	445	120	1.10	
MEAN AGE	7.8																				

Appendix 29. Percent occurrence of various food types found in the stomachs of walleye examined, Tathlina Lake, 1979.

Number Fish	Number Fish Feeding	Percent Feeding	Fish Remains		Benthic Invertebrates		Zooplankton		Unidentified Remains	
			No.	%	No.	%	No.	%	No.	%
727	143	19.7	48	33.6	50	35.0	9	6.3	16	11.2

Appendix 30. Biological data by length interval for lake whitefish caught by experimental gill nets, Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
180	2	183	90	14	1.47	0	-	-	-	-	-	-	2	183	90	14	1.47	0
200	1	207	120	-	1.35	0	-	-	-	-	-	-	1	207	120	-	1.35	0
240	-	-	-	-	-	-	1	243	200	-	1.39	0	2	244	190	14	1.31	0
270	1	270	320	-	1.63	0	-	-	-	-	-	-	1	270	320	-	1.63	0
280	1	286	360	-	1.54	100	-	-	-	-	-	-	2	287	330	42	1.40	50
290	-	-	-	-	-	-	1	292	340	-	1.37	100	1	292	340	-	1.37	100
300	4	304	450	68	1.60	0	-	-	-	-	-	-	4	304	450	68	1.60	0
310	1	314	500	-	1.62	100	3	315	473	23	1.52	67	4	315	480	23	1.54	75
320	2	325	570	42	1.66	50	1	325	600	-	1.75	0	3	325	580	35	1.69	33
330	-	-	-	-	-	-	4	333	595	64	1.62	75	4	333	595	64	1.62	75
340	1	346	540	-	1.30	100	1	342	600	-	1.50	0	2	344	570	42	1.40	50
350	1	357	720	-	1.58	100	2	354	775	120	1.75	100	3	355	757	91	1.69	100
360	2	365	700	57	1.45	100	2	360	930	99	1.99	100	4	362	815	148	1.72	100
370	1	374	800	-	1.53	100	3	376	973	140	1.83	100	4	376	930	144	1.76	100
390	-	-	-	-	-	-	1	395	1080	-	1.75	100	1	395	1080	-	1.75	100
400	-	-	-	-	-	-	3	401	1200	92	1.86	100	3	401	1200	92	1.86	100
410	1	410	1260	-	1.83	100	1	414	1020	-	1.44	100	2	412	1140	170	1.63	100
420	2	424	1450	71	1.91	100	3	421	1460	72	1.96	100	5	422	1456	62	1.94	100
440	2	445	1470	127	1.67	100	-	-	-	-	-	-	2	445	1470	127	1.67	100
450	-	-	-	-	-	-	1	453	1780	-	1.91	100	1	453	1780	-	1.91	100
460	-	-	-	-	-	-	2	463	1770	14	1.79	100	2	463	1770	14	1.79	100
TOTAL	22						29						53					
MEAN		330	681	456	1.59			368	940	445	1.73			349	806	469	1.65	

Appendix 31. Biological data by age group for lake whitefish caught by experimental gill nets, Tathlina Lake, 1979.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
2	3	191	13.9	100	20	1.43	0	-	-	-	-	-	-	-	3	191	13.9	100	20	1.43	0
3	-	-	-	-	-	-	-	1	243	-	200	-	1.39	0	2	244	1.4	190	14	1.31	0
4	4	299	9.1	445	75	1.65	25	1	319	-	500	-	1.54	0	6	301	12.3	430	89	1.57	17
5	3	302	28.4	453	117	1.61	67	5	324	18.8	544	119	1.58	40	8	316	23.6	510	120	1.59	50
6	3	339	28.7	553	180	1.39	67	5	335	23.1	660	200	1.70	100	8	337	23.3	620	188	1.58	88
7	4	356	20.5	695	85	1.54	75	3	353	20.2	783	301	1.72	100	7	355	18.7	733	190	1.62	86
8	1	410	-	1260	-	1.83	100	4	386	23.4	985	102	1.73	100	5	391	22.9	1040	152	1.75	100
9	1	427	-	1500	-	1.93	100	2	400	0.0	1150	42	1.80	100	3	409	15.6	1267	204	1.84	100
10	1	420	-	1400	-	1.89	100	4	417	9.1	1420	99	1.96	100	5	417	8.0	1416	86	1.95	100
11	1	445	-	1380	-	1.57	100	2	459	8.5	1780	0	1.84	100	3	454	10.1	1647	231	1.75	100
15	-	-	-	-	-	-	-	1	460	-	1760	-	1.81	100	1	460	-	1760	-	1.81	100
TOTAL	21							28							51						
MEAN		325	74	639	421	1.59			368	53.7	940	454	1.73			346	66.8	788	465	1.65	
MEAN AGE	6.6																				

Appendix 32. Biological data by length interval for northern pike caught by experimental gill nets, Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
260	-	-	-	-	-	-	1	273	160	-	0.79	0	1	273	160	-	0.79	0
280	-	-	-	-	-	-	1	292	420	-	1.69	100	1	292	420	-	1.69	100
300	2	312	250	14	0.83	100	-	-	-	-	-	-	2	312	250	14	0.83	100
320	2	330	260	28	0.72	100	2	337	250	14	0.65	50	4	334	255	19	0.69	75
340	1	343	300	-	0.74	100	2	354	310	14	0.70	50	3	350	307	12	0.71	67
360	2	372	350	14	0.68	100	-	-	-	-	-	-	2	372	350	14	0.68	100
380	-	-	-	-	-	-	2	390	400	0	0.67	50	2	390	400	0	0.67	50
400	3	411	407	90	0.59	67	4	409	460	49	0.67	75	7	410	437	69	0.63	71
420	3	426	457	38	0.59	100	1	420	560	-	0.76	0	4	424	483	60	0.63	75
440	4	450	515	57	0.57	100	4	445	520	49	0.59	75	8	447	518	49	0.58	88
460	1	473	630	-	0.60	100	-	-	-	-	-	-	1	473	630	-	0.60	100
500	1	509	880	-	0.67	100	1	512	900	-	0.67	100	2	511	890	14	0.67	100
540	1	558	1080	-	0.62	100	-	-	-	-	-	-	1	558	1080	-	0.62	100
560	-	-	-	-	-	-	1	577	1300	-	0.68	100	1	577	1300	-	0.68	100
640	-	-	-	-	-	-	2	643	2180	28	0.82	100	2	643	2180	28	0.82	100
760	-	-	-	-	-	-	1	768	3100	-	0.68	100	1	768	3100	-	0.68	100
TOTAL	20						22						42					
MEAN		411	463	213	0.65			441	756	760	0.73			427	617	582	0.69	

Appendix 33. Biological data by age group for northern pike caught by experimental gill nets, Tathlina Lake, 1979.

AGE (YR)	MALES							FEMALES							COMBINED						
		LENGTH(MM)		WEIGHT(G)			%		LENGTH(MM)		WEIGHT(G)			%		LENGTH(MM)		WEIGHT(G)			%
	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT
2	1	306	-	240	-	0.84	100	1	273	-	160	-	0.79	0	2	290	23.3	200	57	0.81	50
3	6	358	49.9	330	118	0.71	100	3	348	10.0	287	42	0.67	33	9	355	40.1	316	98	0.70	78
4	6	422	36.4	452	120	0.59	83	8	399	48.8	460	70	0.78	75	14	409	44.1	456	91	0.70	79
5	4	486	60.1	708	325	0.58	100	6	480	88.2	853	679	0.68	67	10	482	74.4	795	545	0.64	80
6	-	-	-	-	-	-	-	2	609	44.5	1730	608	0.75	100	2	609	44.5	1730	608	0.75	100
7	-	-	-	-	-	-	-	1	768	-	3100	-	0.68	100	1	768	-	3100	-	0.68	100
TOTAL	17							21							38						
MEAN		408	71	456	231	0.65			446	122.0	780	770	0.73			429	103.0	635	609	0.69	
MEAN AGE	4.1																				

Appendix 34. Biological data by length interval for burbot caught by experimental gill nets, Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
650	-	-	-	-	-	-	1	655	1680	-	0.60	100	1	655	1680	-	0.60	100
660	-	-	-	-	-	-	1	667	1660	-	0.56	100	1	667	1660	-	0.56	100
TOTAL	0						2						2					
MEAN		-	-	-	-			661	1670	14	0.58			661	1670	14	0.58	

Appendix 35. Biological data by length interval for longnose sucker caught by experimental gill nets, Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
260	1	260	240	-	1.37	0	-	-	-	-	-	-	1	260	240	-	1.37	0
300	1	302	340	-	1.23	0	-	-	-	-	-	-	1	302	340	-	1.23	0
310	-	-	-	-	-	-	1	316	420	-	1.33	0	1	316	420	-	1.33	0
360	1	364	700	-	1.45	100	1	367	660	-	1.34	0	2	366	680	28	1.39	50
370	2	370	680	28	1.34	0	-	-	-	-	-	-	2	370	680	28	1.34	0
380	3	384	753	31	1.33	100	-	-	-	-	-	-	3	384	753	31	1.33	100
390	1	390	700	-	1.18	100	2	391	780	57	1.30	100	4	393	780	73	1.29	75
400	4	404	875	118	1.33	100	-	-	-	-	-	-	4	404	875	118	1.33	100
410	3	412	900	35	1.29	100	5	414	916	62	1.29	100	8	413	910	51	1.29	100
420	5	424	1072	30	1.40	100	4	425	1045	96	1.37	100	9	424	1060	64	1.39	100
430	2	434	1080	57	1.32	100	-	-	-	-	-	-	2	434	1080	57	1.32	100
440	7	444	1167	63	1.34	100	3	445	1220	60	1.38	100	10	444	1183	64	1.35	100
450	2	454	1300	170	1.39	100	1	456	1280	-	1.35	100	3	455	1293	121	1.38	100
460	1	464	1260	-	1.26	100	2	462	1250	14	1.27	100	3	463	1253	12	1.27	100
470	2	474	1420	28	1.33	100	5	471	1420	91	1.36	100	7	472	1420	75	1.35	100
480	2	485	1550	42	1.36	100	1	485	1520	-	1.33	100	3	485	1540	35	1.35	100
490	-	-	-	-	-	-	2	493	1590	14	1.33	100	2	493	1590	14	1.33	100
500	-	-	-	-	-	-	5	506	1688	123	1.30	100	5	506	1688	123	1.30	100
510	-	-	-	-	-	-	2	517	1760	226	1.27	100	2	517	1760	226	1.27	100
520	-	-	-	-	-	-	3	523	1800	260	1.26	100	3	523	1800	260	1.26	100
TOTAL	37						37						75					
MEAN		417	1008	299	1.34			457	1297	383	1.32			437	1149	370	1.33	

Appendix 36. Biological data by length interval for white sucker caught by experimental gill nets, Tathlina Lake, 1979.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%		LENGTH(MM)	WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
320	1	328	520	-	1.47	0	-	-	-	-	-	-	1	328	520	-	1.47	0
340	-	-	-	-	-	-	1	343	740	-	1.83	0	1	343	740	-	1.83	0
420	-	-	-	-	-	-	1	427	1080	-	1.39	100	1	427	1080	-	1.39	100
430	-	-	-	-	-	-	1	435	1180	-	1.43	100	1	435	1180	-	1.43	100
450	-	-	-	-	-	-	1	458	1420	-	1.48	100	1	458	1420	-	1.48	100
500	-	-	-	-	-	-	1	503	1760	-	1.38	100	1	503	1760	-	1.38	100
TOTAL	1						5						6					
MEAN		328	520	-	1.47			433	1236	381	1.50			416	1117	449	1.50	